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EDITORIAL

Commercial Cooperation

WORKING with the technical papers appearing in the pages that follow, two of them in particular served to emphasize a fact which has become increasingly apparent through the years. We mean that scientific data and developments evolved by public agencies of research arrive at practical value for the farmer only as they are embodied in materials or mechanisms produced and merchandised by private industry.

Mr. Hansen happens to represent private industry, albeit not in the narrow sense of a single company, but rather in the cooperative effort of many companies to expand markets for themselves by creating greater and better ways for use of their common product. Mr. Wileman is in public service, with no direct duty to serve industry but rather to serve all America by assisting agriculture. Yet, by the time their work reaches the point of actual usefulness, they are on common ground.

Mr. Hansen's approach involves no particular questions of policy or ethics. He simply draws on the public domain of data in animal husbandry, farm management, etc., and combines with it the results of research and development by his own commercial backers. In Mr. Wileman's study there was intimate cooperation between his college and a certain company in the farm machinery industry. No doubt the work went forward faster and more economically by the interaction of the two diverse agencies.

From all that we can observe in this and similar examples of joint activity in what we may call the applicational aspects of research, it is an efficient and wholesome expedient. Despite the opportunity for demagoguery to talk of favoritism or competitive advantage, there seems no solid foundation for such talk. As long as there are plenty of colleges, plenty of companies, and plenty of perplexing problems to be attacked, plus a fine sense of fairness and public service on both sides, such cooperative development by public and commercial agencies should be encouraged and extended.

Proration vs. Dumping

SUBSTANTIAL problem in itself, the disposal of surplus materials and equipment from the war program dovetails into still greater problems, notably employment and the restoration of a healthy rate of general business which alone affords a sound basis for farm prosperity. As engineers we naturally shrink from waste or inefficient use of such national assets.

As a policy which will insure their orderly absorption into our economic fabric without tossing a monkey wrench into the gears of industry and distribution, we suggest a single, simple principle. Let the release of army and navy supplies and other government stockpiles be prorated to private production. For example, take a certain classification of roll roofing and assume a ratio of 20 per cent. If currently produced roofing sells in a month or a quarter to the extent of a million rolls, then government surplus would be released to the amount of 200,000 rolls.

Proration would protect against demoralization of business and employment by dumping into the market. At any level of business activity, the amount released would be keyed to demand. This would insure brisk competition for the amount released, and return to treasury and taxpayer the maximum salvage. Both the risk of loss and the possibility of speculative profit would be held to a minimum, thereby encouraging quick turnover and narrow margins.

The percentages to be used should be agreed upon by government and business after factual study of surpluses on hand, normal production capacity, and other pertinent factors. The exact percentage chosen is not important; that it be consistently maintained, so that industry and commerce can depend on it, is essential.

Agricultural engineers, probably more than any other branch of engineering, have much at stake in policies of surplus disposal. Purchasing power, or at least purchasing propensity, of farmers is so closely keyed to current prices, and these stay in such close step with industrial payrolls, that the whole agricultural engineering program of farm rebuilding, re-equipment and improvement is mainly contingent on continuing employment and business volume.

Fish Story

WAIVING the skepticism which automatically attends the mention of fish, we direct the attention of agricultural engineers to the reports of "fish farming" which are circulating briskly despite the distractions of war and politics. Even with a proper piscatorial discount, fish farming seems to promise considerable work for our profession if it is to fit efficiently into soil and water conservation. It looks like an economic answer to many a knotty problem of runoff disposal and land utilization.

Whereas the aboriginal corn grower showed the white man how to use fish for fertilizer, the present development hinges on the use of fertilizer for fish. According to report put forth by a usually responsible source (Arthur D. Little, Inc. "Industrial Bulletin" for October 1944), properly fertilized ponds may produce as much as 300 pounds of fish per acre, compared with a usual limit of about 225 pounds of beef from good pasture. That is hardly a basis for flooding fine pasture, but it might well permit a project for orderly disposal of runoff to pay its way.

The same report states that during the first half of this year, in Oklahoma alone, well over 2,000 ponds were built. It is intimated, as we would expect, that fish are far from the sole objective in pond building. In any event, no one but the agricultural engineer is so well qualified to estimate the maximum and minimum amounts of runoff to be expected, and to dovetail the fish phase into an over-all plan for water control and land utilization. Meanwhile we well may widen the circle of entomologists, pomologists and other cooperating scientists to include the ichthyologist.

NRSSP

AGRICULTURAL engineers will be interested in the activities of one federal government agency, the National Roster of Scientific and Specialized Personnel of the War Manpower Commission, which has rendered invaluable assistance to the nation in recruiting the services of scientists and engineers for war emergency needs. A description of the organization and functions of NRSSP, as well as its activities in the fields of agricultural engineering specialization, will be found elsewhere in this issue.

So far fewer than five hundred agricultural engineers have registered as such with the Roster. Those who have not registered and who wish to do so, should write to the agency in Washington for copies of Form 102 (NR) and Form 100-94.

AGRICULTURAL ENGINEERING

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A Firesafe, Labor-Saving Livestock Compound

By E. L. Hansen

MEMBER A.S.A.E.

FARM building authorities agree that there is a need for farm buildings that provide optimum conditions for livestock and poultry, that reduce labor to a minimum and that can be built economically.

American farmers are still building numerous structures on each farm — scattered about to prevent all from burning if one catches fire and to separate the filth of an insanitary hog lot from the dairy barn.

Making wider use of new building materials and equipment and balanced feeds, many farmers are changing their methods of livestock production. In the large poultry-producing areas chickens seldom run loose — they are confined to batteries, houses or sun porches. The practice of raising hogs on a concrete floor from farrowing to market is rapidly spreading. Except during the pasture season, dairy cows are confined to the barn and barn lot. Beef cattle are also confined to the dry lot during fattening.

Sanitation and balanced diets permit this type of management. Animals are being concentrated into smaller areas. Regular care of watering, feeding and cleaning is necessary. To keep labor to a minimum in any livestock enterprise, work must be simplified and chore routes shortened as much as possible.

On many general farms we find dairy cows, hogs and poultry; on others, beef cattle, hogs, poultry, and perhaps some dairy cows. We find that many feeds are common to all animals. Even poultry are being fed grass silage. Protein supplements are common to all. Some feeds are ground and mixed with others. This being the case, a common feed storage and room for mixing is desirable to utilize the same equipment for grinding, mixing, elevating and carrying feed.

Conserving liquid manure is also a good practice. Authorities point out that 80 per cent of the entire weight of manure is liquid and that it contains the most quickly and highly available plant nutrients. One-third the value of manure is usually lost when no care is taken to conserve the liquid. Therefore, a common system to do this job for all farm livestock is desirable.

The use of concrete and concrete masonry in farm buildings makes possible sanitation and firesafety, which in turn makes it possible to combine buildings into one or two central plants that can be laid out for most efficient operation.

Engineering Advantages of Combining Farm Buildings. From an engineering standpoint there are many advantages in combining livestock buildings, a few of which may be summed up as follows:

1 Less heat loss from buildings in winter because there are fewer outside walls.

2 Lower cost because some walls serve the purpose of two; interior walls need not be as heavy; less material is required for footings and foundation walls; less piping is required to provide running water to each unit; less wiring and fewer entrance installations are necessary to provide electricity.

3 Firesafe construction can be used thus lowering insurance cost.

4 Light, ventilation, humidity and temperature can be controlled at optimum conditions using one system for all livestock units.

5 Work simplification; knowing the requirements of any particular farm it is possible to plan a layout for maximum efficiency.

6 Less land is needed for a farmstead.

7 Chores can be confined to one building.

To illustrate some of these advantages, the accompanying plan has been prepared. It is not a final plan but provides for 10 cows, 2 pens and milk house, 10 sows, 100 hens, with central feed storage and paved yards for animals. The main plant is 34x78 ft. By combining the hog house, poultry house, milk house and dairy barn as shown, instead of building each as a separate building, we find the following to be true:

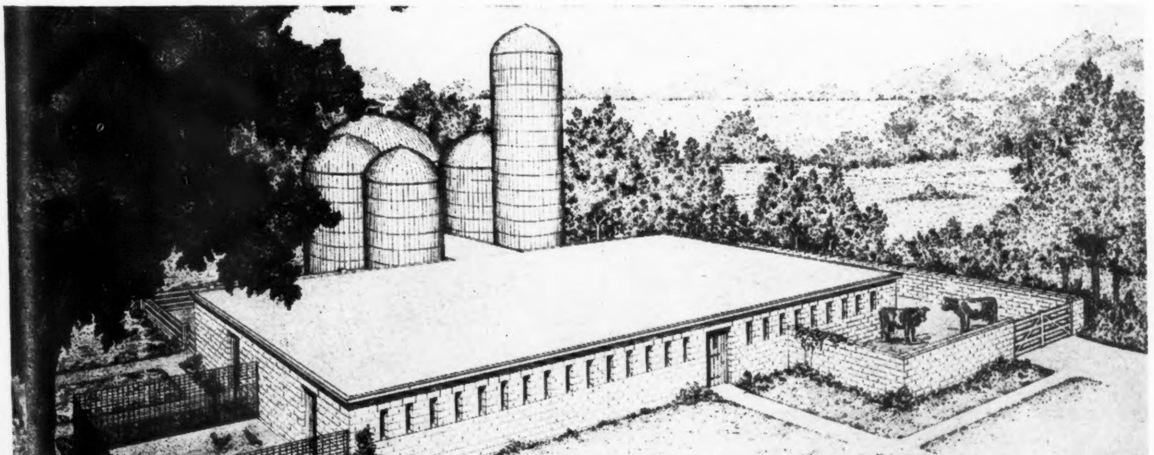
1 There is 60 per cent less outside wall area.

2 There is 37 per cent less total wall area.

3 There is 50 per cent less material in footings and foundations.

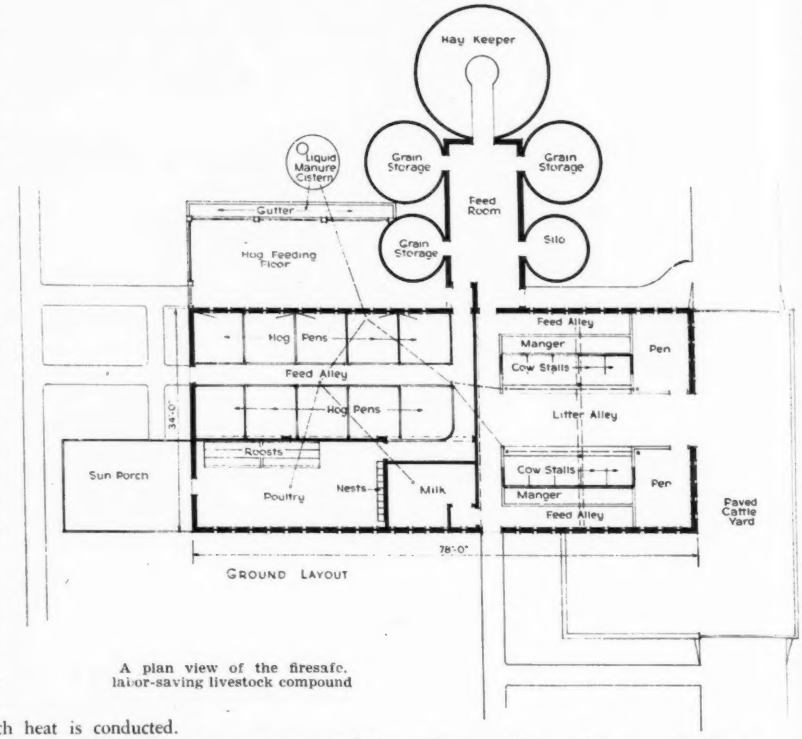
Immediately one can see the saving in material and labor in the first cost of the structure. What is not so apparent is the significance of the 60 per cent reduction in outside wall area. In cold

An architectural drawing of the firesafe, labor-saving livestock compound described by Mr. Hansen



climates this is an important factor. Animal heat is usually the only source of heat inside the building. This is desirable if the temperature can be maintained high enough. To conserve this heat in a building, walls must be insulated to retard the conductance of heat through the wall. Engineers speak of the *U* coefficient of the wall which is the number of Btu of heat that will pass through 1 sq ft of wall each hour for each degree difference between inside and outside temperature. Thus if a wall has a *U* coefficient of 0.25, the inside temperature is 50 F (degrees Fahrenheit) and the outside temperature is 10 F below zero, then each hour 15 Btu would be lost for each square foot of outside wall area. For this plant, where outside wall surface was reduced by 1,737 sq ft when buildings were combined, this amounts to 26,055 Btu saved per hour. This may be interpreted two ways, namely, normal inside temperatures can be more easily maintained in cold weather, or walls with higher *U* coefficients can be used to lower the cost of construction.

Another factor is the reduced heat loss from the floor. A large per cent of the heat loss of a building occurs where the concrete floor and outside foundation walls join. With 60 per cent less outside wall area there will also be 60 per cent less floor perimeter built against outside foundation walls, through which heat is conducted.



A plan view of the firesafe, labor-saving livestock compound

There are no windows in this particular plan. They may be added if desired, but with electric lights and forced ventilation they are not necessary. Common window glass admits practically no ultraviolet light even when clean. Most windows in farm buildings are not kept clean anyway. They are a source of heat loss and must be adjusted manually to control ventilation. The window effect in the exterior wall is obtained by inserting a concrete silo stave in the wall. Some of these staves may be cast with louvers, such as are used in concrete stave corncribs. These serve as fresh air intakes.

The number and capacity of circular storage bins may vary according to the need. The whole plant may be rearranged, shortened or lengthened to meet the requirements of individual farms. The 4-in concrete masonry interior walls may be torn out and rebuilt in case the type of farming changes. Other types of livestock than are shown may be combined.

About Sanitary Regulations. Present regulations in fluid milk markets would not permit placing hogs and dairy cows in the same building or as close as in this plan. With due respect to existing regulations and being aware of the reasons for such regulations, I feel that if milk of high quality can be produced in structures like this one through the use of tight masonry walls, water under pressure for easy and thorough cleaning, controlled ventilation, germicidal lamps and other modern facilities, then there is a place for such structures. It may be argued that high quality milk could be produced, but the average farmer would not take the necessary care to keep the plant clean and sanitary. As engineers we should design something that is so easily cleaned and kept clean that it is no longer a dirty chore. Barn cleaners, water under pressure for cleaning hog houses, gutters and cisterns for catching manure and eliminating flies are improvements which will make it unnecessary to scatter buildings out to meet regulations. A hog yard may be 100 ft from a dairy barn, yet it can be quite a nuisance if not kept clean. I know from experience that hog houses and poultry houses that are hard to clean are not cleaned as often as the ones that are properly ventilated and have floors that can be scraped and washed.

Another argument that is used against this plan is that only a wall separates hogs and poultry from the dairy barn. Being of concrete masonry this wall can be made tight. If you still think this is bad from a public health standpoint, examine the small restaurants in which you eat as you go about the country. It is very common to find a toilet just off the kitchen or the dining room with only a single wall between the two. This isn't to be recommended, but it is permitted and presents as much or more of a hazard than the arrangement just mentioned.

No doubt there are many other arguments pro and con. There are also many other ways such a plant can be designed and built. The design of farm buildings offers the agricultural engineer a real challenge to apply modern developments which will contribute to a better rural living and more efficient farming. He must know what is available from industry that will affect the farming practices and the design of buildings. How far can we go in eliminating windows, installing air-conditioning systems, using germicidal lamps, barn cleaners, water under pressure and all the other products of industry? It we knew first the importance of providing optimum conditions for livestock, it would be easier to answer. Aside from animal health and production it is still possible through the saving of labor and increased quality of products to justify investments in equipment and buildings that are designed to work together.

Professor Deane G. Carter, University of Illinois, stated in a recent article in "Successful Farming" that "Account records analyzed by the agricultural economics department at the University of Illinois show that building and equipment charges amount to only about 3½ per cent of the cost of getting 100 lb of gain on hogs. This compares with feed costs amounting to about 80 per cent and labor costs of 10½ per cent. This is a very low proportion for housing, and I believe a higher investment in housing and equipment would be worth while in preventing pig losses, saving feed and saving the farmer's time."

The saving of one hour of labor a day valued at 50 cents an hour will completely amortize a building costing $2,700 over a period of 25 years, paying 4½ per cent interest on the unpaid balance. The designer has a definite responsibility to the farmer to utilize every means that can be justified to give him a building which is as functionally correct as possible.

(EDITOR'S NOTE: In submitting this paper for publication, Mr. Hansen wrote: "Since this is rather a new idea in farm-building design, I would like to encourage discussion of it. Manufacturers of farm building equipment, electrical equipment, etc., should have something to say about how the use of their equipment might affect future building design. Others may have constructive criticism of the idea in general." The editor, as well as the author, will therefore welcome discussions from AGRICULTURAL ENGINEERING readers pertinent to the design described and its application to farm conditions and requirements.)

Progress in Controlling the European Corn Borer

By R. H. Wileman
MEMBER A.S.A.E.

THE lack of general publicity regarding the European corn borer during the past few years does not in the least indicate that the potential menace of this insect pest to the nation's corn crop has been reduced. In fact, the corn borer has quite rapidly extended its area of conquest until it has now invaded as far west as central Iowa and Missouri. At the same time it has extended the area of infestation, it has gradually built up populations in the older infested areas.

In general, there has been a gradual and alarming increase in both borer population and damage. This can best be illustrated by the estimates of the U. S. Department of Agriculture based on their population and damage surveys. In 1942 the estimated damage to the corn crop in the infested area caused by the corn borer was $17,000,000. The estimate for 1943 was $33,360,000 to a corn crop valued at approximately $747,000,000. These figures include the crop grown in the area known to be infested, which includes all of the northeastern part of the United States as far west as central Iowa.

It seems unfortunate indeed that war and other conditions have curtailed research for better methods of controlling this insect pest. This is especially true of the mechanical control phases for which we agricultural engineers are responsible.

At the present time the major portion of corn borer control research is along agronomic plant breeding and entomological lines. A search for varietal resistance probably has first place. This includes a search for or the development of strains or varieties, of both sweet and field corn, which are obnoxious to the corn borer or which have some characteristics that will prevent the normal development of the borer larvae. The evaluation of resistance is judged on the basis of (1) egg deposition, (2) larvae survival, (3) plant tolerance, (4) ear damage, and (5) yield.

Tests of various insecticides as a control on sweet corn when applied both by spraying and dusting are being conducted by the U. S. Department of Agriculture and several state agricultural experiment stations.

Planting dates are being studied to determine the possibilities of selecting a planting time which will escape the major portion of the first generation of borer infestation and still give a long enough growing season to mature the crop.

Parasite or biological controls, seasonal development and life history studies, abundance and damage surveys comprise the major research activities now in progress aside from a limited amount of work along agricultural engineering lines which will be discussed later.

Research studies on all or a part of these phases of corn borer control are being conducted in at least fifteen states by the state experiment stations. In several cases the work is in cooperation with one or both of the USDA Bureaus of Entomology and Plant Quarantine and Plant Industry, Soils, and Agricultural Engineering.

To the best of my knowledge, Indiana is the only state which now has or recently has had active research projects in agricultural engineering phases of European corn borer control. According to the latest information I have, the research work by the federal division of agricultural engineering on corn borer control is limited to the development and study of spraying and dusting equipment for applying insecticides to sweet corn.

On the other hand, if we look at the corn borer control practices now being generally recommended to farmers throughout the infested area, we find that a large percentage of the various recommendations are entirely or in part mechanical controls. Can this mean that we as agricultural engineers are satisfied with the mechanical control methods we now have or are we resting on our oars while the corn borer slowly eats up the corn crop?

I am happy to report that agricultural engineering research on corn borer control at Purdue has been kept going although somewhat curtailed. At present we have three active projects, all of which are in cooperation with the department of entomology, which I wish to credit for their part in securing the material presented in the next few paragraphs.

The experiment to determine the effectiveness and practicability of the light trap for controlling the corn borer is still active. New types of lamps which give various colors and intensities of light as well as different spacing of lights over the field are being tried. This work also gives the entomologists a very good opportunity to study moth emergence and brood appearance. A progress report on this work was presented before the Society at one time by Professors T. E. Hienton and G. A. Ficht.

As you know, clean plowing has long been recommended as a control measure. It is an established fact that plowing corn borer larvae under does not necessarily kill them but that a certain percentage will again come to the surface to look for some refuse in which they can find protection to pupate and emerge as moths. Lacking such refuse on the surface, the borer larvae will perish or not be able to complete its life cycle. Therefore, clean plowing gives effective control. Plow trash shields, trash wires, and proper plow adjustment materially aid the farmer in doing a clean job of plowing.

For the past three years we have been studying the effect of soil type, season or time of burial, and depth of burial on the per cent of borers which actually emerge or come to the surface after plowing. Six soil types, namely, sand, muck, crosby, Brookston, Clyde and Jack Wax, are being used. Burials at 5-in depth are made in all the soil types, except muck at 7-in depth in all types and at 10-in depth in sand and muck. This study includes late fall, early spring and late spring concentrated burials at all depths and in all the soil types listed above and actual field plowing tests on crosby, Brookston and Clyde soils at 5 and 7-in depths.

Contrary to what might be expected the data show a lower emergence of borer larvae from the light soils, namely, sand and muck, than from the heavier soils. The emergence from the light

This paper was presented at the annual meeting of the American Society of Agricultural Engineers at Milwaukee, Wis., June, 1944, as a contribution of the Power and Machinery Division.

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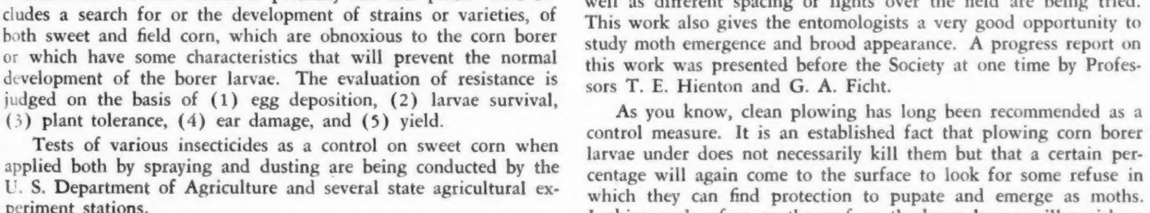
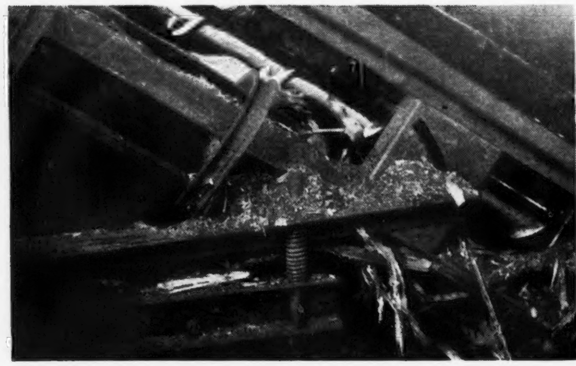


(Left) Traps used for concentrated corn borer burial studies at Purdue University. Records of borer emergence from below ground are secured for six common soil types, at three depths of burial. Burials are made in these traps at three different periods during the year • (Center) Close-up of concentrated corn borer burial trap. Note the cardboard cells along the inside top edges of the box where the corn borer larvae collect. The oilcloth covers are thrown back. These normally cover the cardboard cells to make them dark • (Right) A series of four box type field traps in which data on corn borer emergence from stalks plowed under in the field are secured. Two of these traps are placed on each soil type being studied for each plowing date. The strip traps are for migration studies



(Left) This picture shows the cornstalk pulverizing attachment on a conventional corn picker. It sets below the snapping rolls and is driven by the power take-off of the tractor • (Right) Before and after the corn picker equipped with the pulverizing attachment has passed over a field

soils is also slower and spread out over a longer period than in the heavy soils.

The time or season of burial shows even a greater spread in percentage of emergence than does the soil type. The average emergence from all the soil types at all depths of burial for late fall and late spring is 25.8 per cent with less than one per cent spread between them as compared to 60 per cent for early spring burial. In other words, two and one-third times as many borers come to the surface following early spring plowing as compared to late fall or late spring plowing.

The depth of burial shows some effect on the number of borers which return to the surface. The average emergence for all soil types and all times of burial at the 5-in depth is 44.5 per cent, as compared to 38 per cent for 7-in burial. The burials in sand and muck at 10 in show a 20.1 per cent emergence as compared to 31.1 per cent for the same soils at the 7-in depth.

These data show the necessity for clean plowing to secure effective corn borer control. Whenever possible cornstalks should be plowed under in the late fall or late spring rather than early spring.

It is doubly important to plow clean in the heavier soils where clean plowing is most difficult. This is indeed a challenge to agricultural engineers to develop better plows and plow accessories which will enable the farmer to secure complete coverage of corn crop residues to assure effective corn borer control.

Last but not least, in my opinion, is the development and testing work we have under way on a stalk pulverizing attachment for corn pickers. This work was started in the spring of 1942 in cooperation with the International Harvester Company. The primary objective is to develop an attachment for corn pickers which will cut and shred or pulverize the stalks in such a manner that the corn borers contained in them will be killed at the same time the corn is picked.

The first attachment was constructed on a single-row pull type picker during the summer of 1942. Field tests were started that fall and continued throughout the winter and early spring. We chose the pulverizing or hammer mill principle as the most desirable from the standpoint of space and power requirements, both of which are limited, as we wanted to drive the attachment from the power take-off.

As a result of the first season's work, we started in last fall with the third completely new attachment, which incorporated changes and additions we found necessary during the field trials. Probably the most drastic and also the most beneficial of these was that of reversing the direction of rotation of the hammer cylinder. By this time we had eliminated most of the operating difficulties and were able to do quite a creditable job with very little trouble from choking, wrapping and other difficulties so closely associated with handling cornstalks. The rotation of the hammer cylinder is opposite to the direction of travel of the machine and is adjusted to just clear the ground. With this arrangement the lower part of the stalk is pulverized as the machine moves into it and the remainder of the stalk is fed into the hammers by the snapping rolls. A section of hammer mill screen is provided to the rear of the cylinder to serve as a concave for the hammers to work against in pulverizing the stalks.

The next step was to test various weights and lengths of hammers and determine what hammer speed was necessary to secure effective corn borer kill. This work was done in cooperation with Dr. H. O. Deay of the department of entomology. These tests were made in a 16-acre field of corn which averaged approximately three borers per stalk. Two weights, No. 11 and No. 6 gauge, and three lengths of hammers were tested. The No. 11 gauge hammers were soon discarded due to too rapid wear and some breakage difficulties.

Little difference was found in the effectiveness of the different lengths of hammers as long as the peripheral speed was kept the same. The longest hammers were selected in order to reduce the cylinder speed to a minimum. A further change in the hammer design allowed us to reduce the number of hammers by one-half. It was found that the peripheral speed of the hammers had to be approximately 9,000 fpm for greatest effectiveness. Higher speed gave little or no improvement in either pulverization or corn borer kill.

After the above points had been solved to our satisfaction, a series of nine tests were run to determine the corn borer kill which could be secured. These tests were run under different field and stalk conditions. The first tests were made October 18, 1943, and the last on January 25, 1944. The average borer kill for the nine tests was 95.3 per cent. The long No. 6 gauge hammers operating at a peripheral speed of approximately 9,000 fpm were used for all of these tests. The percentage of kill secured for the individual tests was surprisingly close, ranging between 94 and 97 per cent.

Aside from giving a high corn borer kill, the work of this attachment leaves the stalks in such a condition that they can be readily disked into the soil or plowed under. In fact, the material is considerably finer than ordinary shredded fodder. Sixteen acres where this machine was used last year were double-disked and sown to wheat as soon as the corn was picked. Another twenty-acre field was allowed to lie over the winter and was then double-disked and sown to oats and alfalfa. In both cases a very nice seed bed resulted. There were no whole cornstalks left to interfere with the combine or binder when the wheat and oats were harvested. Another interesting observation was the rapidity with which the pulverized stalks dry out after going through the machine. In many cases the lower part of the stalks was still green when the corn was picked. In fact, the shredded material smelled like ensilage. However, after these green stalks were torn apart, the material dried out sufficiently in from one to two days of favorable weather to be picked up and baled or stored loose. This material could be readily collected and used for roughage, for bedding or for commercial purposes.

It appears that the work of this type of stalk pulverizer has many advantages and its use aside from corn borer control should be profitable and beneficial for any farmer using a corn picker.

In closing, let me again say that agricultural engineers have a definite responsibility in improving present corn borer control methods and in developing new ones. While mechanical methods by themselves may never entirely solve the problem, always bear in mind that a dead corn borer lays no eggs.

Barn Curing of Hay with Heated Air

By John Strait

MEMBER A.S.A.E.

A BARN hay-curing system was constructed by the division of agricultural engineering at the University of Minnesota in 1940 and has been operated under test during four haying seasons. It is a conventional duct system serving a mow 24x36 ft and was installed in one end of a basement type barn. The fan was placed in a lean-to shed at the end of the barn.

During the first two seasons, unheated air was circulated and two cuttings of alfalfa hay were processed each year. The results obtained were fairly satisfactory considering the extremes of weather conditions which were encountered. However, there was a wide range in the quality of the hay produced. When the drying period was extended by unfavorable drying weather, the hay at the surface exhibited a moldy condition, and the quality was generally poor in the upper layer although improving from top to bottom with excellent quality hay always being produced in the lower portion of the mow.

Observation indicated that the quality of hay produced in the barn drying system is a function of the time required to complete the drying process. Under conditions of high atmospheric humidity and relatively low temperatures which are likely to prevail in Minnesota during the alfalfa haying season, it seemed that the drying period would often be extended beyond that permitted for the production of high-quality hay throughout the entire hay mass. Therefore, the use of heated air seemed to be a logical means of insuring that the drying period would not be excessively extended by weather conditions.

In the heated-air installation, an oil-fired furnace was placed between the fan and the main air duct (Fig. 1). The duct system in the 24x36-ft mow was not changed for the heated air experiments, and the same fan, a conventional multiblade fan with a controlled air inlet, was used. The fan circulated approximately 13,000 cu ft of air per minute.

The furnace was designed to produce an increase in temperature of about 20 F in the air delivered by the fan. It was constructed of brick and concrete and unlined. The heat exchange unit (Fig. 2) consists of 23 hot air flues each made from two 24-in lengths of 26-gauge smoke pipe 7 in in diameter. The outlet ends of the pipes were cast directly into concrete slab headers 3 in in thickness. The inlet ends of the pipes project into a 7½-in diameter hole in the concrete headers, and the circumferential space is packed with asbestos cement.

A commercial oil burner capable of burning up to 15 gal of fuel per hour was used to supply the heat. In this installation the burner consumed oil at the rate of approximately 3½ gph. There were two controls in the burner circuit, the primary control in the stack and the hot air control shown in Fig. 2 projecting into the hot air duct. This hot air control served as a safety device which would shut off the burner if, for any reason, the fan should stop.

Air measurements included the dry and wet bulb temperatures at the fan inlet, the dry and wet bulb temperatures of the air as it emerged from the hay, and the temperature of the air in the main air duct about ten feet downstream from the furnace. These were all taken with recording instruments. A pitot tube and manometer were used to obtain the air velocity and resistance pressure.

Heated Air Cycle. A typical air cycle for heated air is shown in Fig. 3. This particular cycle was observed June 24 at 5:00 a.m. Inlet air conditions and the temperature of the heated air had been practically constant for a period of four hours. The average moisture content of the hay at this time was approximately 28½ per cent calculated on the wet basis. Air at the fan inlet having a dry bulb of 77 F and a wet bulb of 71 F is heated at constant moisture or constant dew point to a dry bulb temperature of 100 F as it passes through the furnace. Cooling and humidifying then occurs as the air passes through the hay mass, and as the air leaves the hay, it has a dry and wet bulb temperature of 82 F and 79 F, respectively. The cooling and humidifying process would normally be a constant heat process if a living plant material was not involved and if a state of equilibrium had been established throughout the system. However, biological processes and varying temperatures of the material cause the actual cooling and humidifying process to deviate from the constant heat process. The relative magnitude and potential of the two influencing factors determine the amount of deviation and the relative position of the actual process with respect to the constant heat process. In the typical cycle shown there is an apparent gain of approximately 1.9 Btu per lb of dry air. Considering the fact that the air conditions had been

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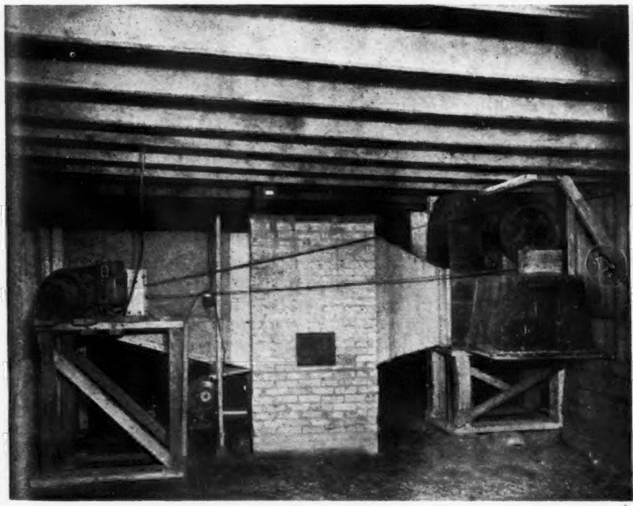
AUTHOR'S NOTE: The author wishes to express his appreciation to A. J. Schwantes, chief, division of agricultural engineering, University of Minnesota, for his many helpful suggestions and criticisms relative to the research work and the preparation of this paper.



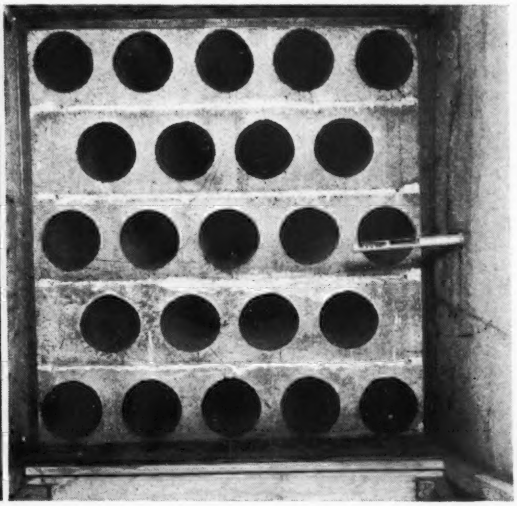


Fig. 1 (Left) This view shows the oil-fired furnace placed between the fan and the main air duct in the heated-air installation used in the Minnesota studies of barn curing of hay • Fig. 2 (Right) Heat exchange unit showing outlet ends of the pipes cast into concrete slab headers.

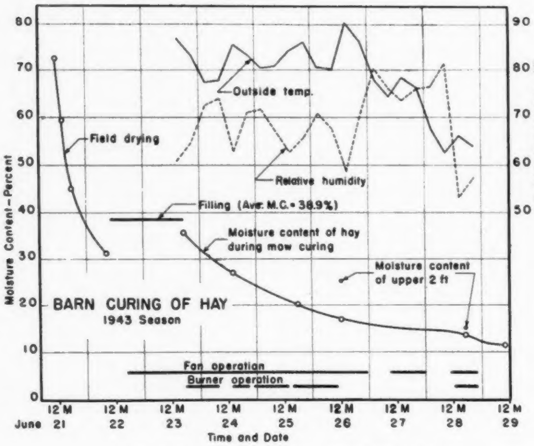


Fig. 3 A typical air cycle for heated air

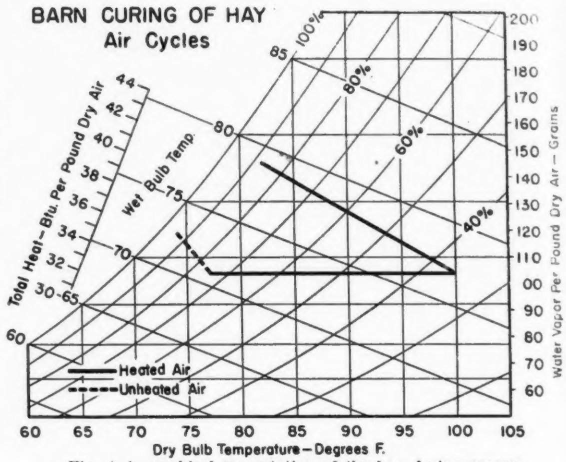


Fig. 4 A graphical presentation of the hay drying process

stable for a period of four hours prior to the time this air cycle was observed, the increase in heat content may be logically attributed to natural biological processes occurring in the plant material. It is not intended, however, that 1.9 Btu per lb be considered as the exact heat equivalent of these natural processes since it is very difficult to obtain exact and truly representative wet bulb temperatures above the hay. This assumption is further substantiated if the rate of heating of the hay which was observed when the fan was stopped is considered to be due to the heat equivalent of these same natural forces. The air will lose heat during the cooling and humidifying process when conditions prevail which result in a sensible heat transfer from the air to the hay. This condition was particularly noticeable when the burner was first started after the fan had been in operation for some time, and the temperature of the hay mass was near the wet bulb temperature of the inlet air.

The moisture removed per pound of dry air circulated through the hay was 41 grains, which is the difference in the weight of water vapor in one pound of dry air before and after passing through the hay.

Unheated Air Cycle. The unheated air cycle shown in Fig. 3 is an assumed cycle starting at the same dry and wet bulb temperatures as the heated air cycle. The air is both cooled and humidified as it passes through the hay. An assumed final relative humidity of 95 per cent and the degree of heat absorption which is assumed to be approximately the same as in the heated air cycle should be considered to be favorable to the unheated air cycle when comparing the two. Experimental data indicate that this assumed cycle is adequate for conservative consideration of the benefits to be derived from the use of heated air as compared to the unheated air cycle.

Comparison of the Two Cycles. The amount of moisture carried from the hay is approximately 15 grains for each pound of unheated air circulated. Comparing this figure with the 41 grains removed in heated air cycle, it is evident that the drying capacity of a system can be greatly increased by heating the air before it is forced through the hay. It is obvious that this advantage would be even greater during periods of high atmospheric humidity when the drying effect of unheated air would be negligible.

Results. The hay produced in the barn hay curing system using heated air was of superior quality in every respect. The entire mow was free from mold, and the hay was leafy and very green in color.

Fig. 4 is a graphical presentation of the drying process and includes other data pertinent to the process as well as a comparative curve showing the rate of field curing of a representative sample of the hay which was dried in the barn. This curve is intended only as a rough comparison of the drying rate of the plant in the field with that obtained in the barn drier. The drying conditions were very favorable for field curing when this curve was obtained. No readings were taken during the late evening and night, and a smooth curve was drawn between the last evening reading taken and the final moisture content determined the next forenoon. This is presented with full realization that the curve does not represent the true drying rate for the material for the late evening and night interval. It does emphasize the high rate of moisture loss during the early stages of the drying process when the recently cut alfalfa plant is exposed to favorable natural drying forces.

The barn drying curve shows the average moisture content of the hay mass at various intervals during the drying period. The hay was placed in the mow to an unsettled depth of approximately 8 ft during a two-day period beginning at noon, June 22, and continuing to the evening of June 23. The average moisture content of the hay as it was placed in the mow, and which was determined by taking moisture samples from each load, was 38.9 per cent on the wet basis. The fan was operated during the filling period as shown by the periods of fan operation charted in Fig. 4. When filling was completed, the burner was started and operated almost continuously (Fig. 4) until drying was practically completed. An average moisture content for the entire hay mass was determined at this time and at other times during the drying process as indicated, by boring out a sample of hay from top to bottom of the mow with the use of a tubular boring device. Borings were made systematically over the entire mow area, and the average moisture content determined for each of six sections of the mow by drying the samples in an electric oven. The moisture content plotted in Fig. 4 is the average for the six sections.

The average moisture content of the hay at the time the burner was started and with all the hay in place was approximately 36 per cent. During the 64 hr following, and during which time the burner was operated a total of 56½ hr, the moisture content of the hay decreased to 17½ per cent. While the average moisture content was 17½ per cent that of the upper two feet of hay averaged 25.5 per cent and in certain areas appreciably higher. It seemed that the upper layer could be easily and perhaps more economically finished with unheated air, but when the outside air conditions precluded that, the burner was again started and operated for a period of about 10 hr during which the moisture content of the entire hay mass was reduced to 11.8 per cent. The final moisture content of the upper two feet was 18.5 per cent with that in certain areas being 20 to 21 per cent.

The average temperature and relative humidity for successive six-hour periods are plotted to indicate the general weather conditions which prevailed during the drying period. Precipitation occurred twice in moderate amounts during this period.

Operating Costs. Approximately 16 tons of dry hay (15 per cent moisture content) were processed during the 1943 haying season.

The fan was operated a total of 128 hr and consumed 485 kwhr of electrical energy. Therefore, 30.3 kwhr were consumed per ton of dry hay produced.

The burner was used a total of 64.75 hr, and during that time it consumed 237 gal of fuel oil. Approximately 14.7 gal of fuel were burned for each ton of dry hay produced.

On the basis of charges of 3c per kwhr for electrical energy and 7½c per gal of fuel, the costs of operation of the fan and burner were $0.91 and $1.11, respectively, per ton of dry hay. The total

operating cost per ton, therefore, was $2.02. During the 1942 season, 32 tons of first cutting alfalfa were dried at a cost of $2.01 per ton of dry hay for fuel and power. The first cutting was then removed from the mow, and 16 tons of second cutting alfalfa were processed at a cost of $2.30 per ton of dry hay. Extremely bad weather conditions prevailed while the second cutting was being dried.

As a basis of comparison between the cost of drying with heated and unheated air, the power cost for operating the system during the two years unheated air was used ranged from $0.96 to $1.85 per ton of dry hay. The quality of the hay processed with heated air was superior to that dried with unheated air. This difference in quality was particularly noticeable in the upper portion of the hay mass.

Carotene Analysis. Representative samples for the determination of the carotene content of the hay before and after drying in the barn were obtained by use of the boring device previously mentioned. The carotene content of these two samples indicated that 18.5 per cent of the carotene content of the hay at the time the barn curing process began was lost during the subsequent drying period. This loss seems to be reasonably low and was considerably less than could be expected under field-curing conditions.

General Conclusions. The performance of the furnace was quite satisfactory. The thermal efficiency varied up to 78 per cent depending upon the temperature of the outside air. The flues remained in very good condition and indications are that they could be depended upon to last through several seasons of operation before renewal would be necessary. The concrete headers developed slight cracks at the sections of minimum thickness, but there would be no serious objections to this slight cracking once the headers were in place.

Thermocouples cast in the headers (Fig. 2) were used to measure the temperature existing at a point one-half the thickness of the header from the surface. The temperature of the lower header at the center on the outlet side of the furnace was 465 F, while the temperature of the fourth header from the bottom was 300 F. On the fan side of the furnace the temperatures of the lower and upper header were 183 and 136 F, respectively. A thermocouple placed in the side of the furnace ten inches above the level of the top of the combustion chamber showed a temperature of 1150 F, which indicated the need of a refractory lining to reduce this severe heat loss through the furnace walls. In general, however, the furnace performed very satisfactorily considering the low initial cost of the unit.

Disadvantages of Using Heated Air as Compared to Unheated Air

1. Fire hazard
2. Added cost of the hay drying installation
3. Increased operating costs
4. Continuous operation is advisable to avoid the necessity of periodically raising the temperature of the hay mass.

Advantages of Using Heated Air as Compared to Unheated Air

1. High quality hay can be produced under extremely unfavorable weather conditions.
2. Greater drying capacity which may be utilized by increasing the depth of hay to be dried at any one time and still not extend the drying period excessively.
3. Drying time for a given amount of hay is materially shortened which in itself contributes to the production of a higher quality hay.

Discussion by C. E. Seitz

FELLOW A.S.A.E.

VIRGINIA had some forty installations of barn hay curing systems in use during the 1943 season. Applications were received for around 175 additional systems this season (1944), but due to the shortage of materials, especially motors, only about half this number will be installed. Of all these systems only two installations are using heat.

One farmer near Dublin, Va., has had four seasons' experience with the use of heat with the barn drier. He is a commercial hay grower, and bales and sells all his alfalfa hay, so he is not typical of the farmers using hay driers.

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His drier was designed for the use of heated air in connection with the barn hay drying system. The ducts were installed in a hay mow 16 ft wide by 60 ft long with the main duct running through the center of the mow on the long axis. A blower of the double fan type was operated by a 5-hp electric motor. Heat was supplied by a hot water furnace with a grate area of 3 sq ft. The furnace was fired by an automatic stoker. Hot water radiators were placed in an enlarged section of the delivery duct. The air forced through the delivery duct was raised an average of 20 F above atmospheric temperature by maintaining a water temperature of 160 F.

About 70 tons of alfalfa hay were cured by this drier during the 1940 season and observations were made on its operation. The weather conditions during the entire haying season were very unfavorable for curing in the field. Some of the hay placed in this drier was actually hauled in the rain. Hay harvested on nearby farms was frequently a total loss. There were periods of from four to ten days when some rainfall was recorded every day.

The average moisture content of the alfalfa hay as it was placed in the drier was 50 per cent. Some loads contained a higher and some a lower moisture content. The longest time for a batch to remain in the drier was 187 hr, while the shortest time recorded was 34 hr. The average length of time for all cuttings was 97 hr. The blower operated full time during the day and half time at night regardless of weather conditions. The amount of hay in the drier had considerable influence on the length of time required to dry the hay. The depth of hay varied from 4 to 8 ft for all batches. The quality of the alfalfa hay cured was considered very good. The hay retained a large percentage of leaves and its color remained a bright green. The operator was very well satisfied with the drier.

Second-hand heating equipment was used for this installation, but it is estimated that if new equipment had been used the total cost of installation would be about $1700.

This drier using artificial heat required an average of 42.85 kwhr of electricity, and 240 lb of coal per ton of hay dried.

THE MAIN ADVANTAGES OF USING ARTIFICIAL HEAT

The main advantages of the use of heat according to this farmer are (1) a saving in labor and (2) an increase in capacity, enabling the system to be operated day and night thus making it possible to charge the system with two or three batches during one cutting instead of one as is the case with systems not using heat.

The other hay drier installation in Virginia in which the air is heated before it enters the hay is located on a dairy farm in Culpeper County. This system was installed in 1943 and cured three cuttings of alfalfa hay. The barn mow is 40x80 ft. A divided duct system was installed with the fan located at the center of one side of the mow. A double 21-in multivane fan operated at 540 rpm by a 7½-hp motor delivers approximately 22,000 cfm of air into one-half of the system at a time. Cast iron steam radiators are installed in the delivery duct between the fan and main duct. An old horizontal steam engine boiler supplies steam to the radiators. The air forced through the delivery duct was raised an average of 50 F above atmospheric temperature.

Total cost of the installation with heat was approximately $1700, or about 53c per sq ft of mow area in the barn. The same mow area could be equipped with a system not using heat at a cost of about $640, or 20c per sq ft.

The average outside temperature during the 1943 operation of this system was approximately 72 F, and the average relative humidity was approximately 71 per cent. Six to ten days were required to cure out a loading of hay to a depth of 6 ft on one-half of the system, depending on the moisture content of the hay and weather conditions during the curing period. The moisture content of the hay when placed on the system varied from 45 to 60 per cent. This farmer estimates that operating costs were approximately $2.50 per ton of cured hay. This included firewood for the boiler, labor for firing, and electricity for operating the fan. The mow-cured hay was of such good feeding quality that the amount of protein in the grain ration was reduced by one-third, and the herd produced at record levels. This farmer figures his mow-cured hay is worth $10 per ton more than if it had been cured in the field.

This year this farmer installed a hay drier duct system in another barn on his farm, so that he can handle his entire alfalfa crop with the combined duct systems. The new system operates without heat. He feels that the only advantage gained by heat is the ability to shorten the curing period, *(Continued on page 426)*

A Sheller for Seed Peanuts

By O. A. Brown and I. F. Reed

MEMBER A.S.A.E. MEMBER A.S.A.E.

SOME of the many problems found in peanut production and harvesting have been discussed in the articles, entitled "Machinery Problems in Peanut Production" by Wm. E. Meek, Jr., and "Developments in Peanut Harvesting Equipment" by I. F. Reed and O. A. Brown (AGRICULTURAL ENGINEERING for February 1943 and April 1944, respectively). These articles cover most of the progress in tillage and harvesting problems but omit the problems of getting the seed ready for planting. Peanuts may be planted with or without shelling, but most farmers prefer to plant the shelled seed as it is much easier to handle, requires less moisture for germination, and usually produces quicker and more uniform stands.

Before planting time the farmer is confronted with the problem of getting the seed shelled. Shelling peanuts by hand is a tedious, laborious job. To have peanuts shelled in commercial shellers entails some inconvenience to small farmers, and poor stands are often attributed to damage inflicted by commercial shellers. These facts, plus the increase in acreage shown in our earlier article and the shortage of labor for shelling seed peanuts by hand, have created a demand for a small sheller that will do this job efficiently and effectively.

Most peanut shellers on the market are expensive and are stationary units with relatively large capacity. They cost $500 and up and require 5 hp or more to operate them. This limits the units to custom operators or to farmers with a large acreage in peanuts. The small seed peanut sheller shown in Fig. 1 was developed at the USDA Tillage Machinery Laboratory at Auburn, Alabama, to meet the needs of the farmer with, say, 30 or more acres, or groups of farmers with smaller acreages.

A sectional view of the seed peanut sheller is shown in Fig. 2. It is 36 in high exclusive of hopper, and the cylinder is 13 in wide. It is arranged so that one V belt from a 1-hp electric motor or a 1½-hp engine to the rotating shafts drives the entire unit. The sheller, less power unit, weighs only 165 lb and will turn out about 300 lb of shelled peanuts per hour. This is about what one man can do by hand in 30 days of 10 hr each.

This paper was prepared expressly for AGRICULTURAL ENGINEERING.

O. A. BROWN and I. F. REED are, respectively, agricultural engineer and senior agricultural engineer, Bureau of Plant Industry, Soils and Agricultural Engineering, U. S. Department of Agriculture.

Fig. 1 Simplicity of drive, recleaner feed, fan discharge, vibrating shoe, and seed spout are shown in this USDA seed peanut sheller

The shelling unit has two parts, a rubber-covered cylinder and a perforated concave. Fig. 2 shows the location and the construction of the hulling chamber. The spacing between the cylinder and the concave is approximately 1½ in. The concave may be adjusted to give the best shelling results. The shelling cylinder is driven at approximately 500 rpm. This higher speed than that used on most peanut shellers, together with the rubber cover on the cylinder, accounts for the large capacity of the machine. The unshelled peanuts are rubbed against each other by the shelling cylinder until the shells are broken. The shelled peanuts and broken shells then pass through the perforated screen into the air separator.

The air separator which separates the shells from the peanuts is made as simple as it is possible to construct it. The two boards which form either aspirator make an angle of 90 deg with each other under the concave. The fan, 5 in wide and 12 in in diameter, has an intake from the aspirators on either side of the discharge spout, and is shown in Fig. 2.

In operation the shelled peanuts, shells, and unshelled peanuts that pass through the concave fall through the upward air blast in the aspirator unit. The shells and other light material are thus sucked into the fan and are blown out through the discharge. The shelled and unshelled peanuts fall through the air blast onto the screens in the vibrating separator unit.

The separator unit consists of two screens mounted one above the other in a framework vibrated by arms connected to eccentrics on the cylinder shaft. Adjusting the lengths of these arms changes the arc of the screen vibration and controls the rate at which the material moves over the screen. The holes in the top screen are 26/64 in in diameter and those in the bottom screen are 14/64 by 1¼ in. The unshelled peanuts flow over the top of the upper screen and are discharged as tailings to be put through the sheller again. The shelled peanuts pass through the top screen but are retained on the lower screen and are discharged through the spout shown. Cracked peanuts and other small material pass through both screens and may be collected in a box under the sheller. The unshelled peanuts can be put through the cylinder unit as many times as is necessary to shell them but shelled peanuts will be broken if fed through the shelling unit a second time. The recleaner feed shown in Fig. 2 is provided to enable recleaning the shelled or cracked peanuts. This permits feeding the material through the cleaning units without putting it through the cylinder.

(Continued on page 426)

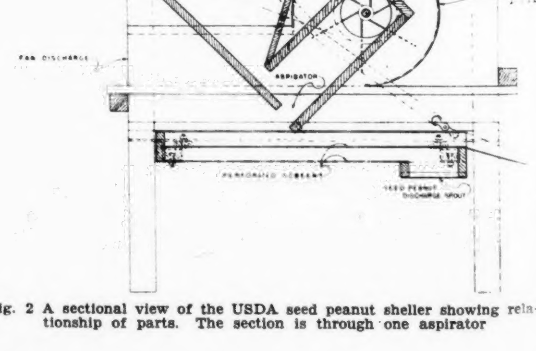

Fig. 2 A sectional view of the USDA seed peanut sheller showing relationship of parts. The section is through one aspirator

A 100 Per Cent Cooperative Terracing Program

By C. V. Phagan
MEMBER A.S.A.E.

IN South Carolina — and the same is doubtless true in other states — we have different types of terracing programs or methods of getting the job done. In some counties most of the terracing work is done with big outfits such as track-type tractors and blade machines, while in other counties the equipment consists of farm tractors and disk plows, mules, turning plows, small terracers, and drag pans.

The success of a terracing program, of course, is not determined by the number or kinds of terracing outfits nor by the number of feet of terraces built in a specified length of time. A better measure of success, in my opinion, is the degree of cooperation among agency representatives and the degree to which key farmers are trained to supervise terracing work, both construction and maintenance, in their respective communities.

We have in South Carolina several counties that are carrying on very successful terracing programs. In this paper I shall attempt to describe the setup or organization of the Anderson County program, where farmer contractors are running lines and building terraces with their tractors and disk tiller plows.

Anderson County is located in the Upper Piedmont section of South Carolina where the topography is rolling to hilly and where sheet and gully erosion are quite active. The soils are residual and alluvial derived from granitic gneiss and water-lain material, respectively. The Cecil series is the predominating soil type. There were, in round numbers, 6,400 farms in Anderson County in the 1940 federal census report and the average size farm was 64 acres. There are about 400 tractors in the entire county which is only one tractor for each 16 farms on the average.

County-Wide Meeting. Soon after announcement was made of the AAA purchase order plan for getting terracing, the county agent, the AAA county administrative officer, and the Soil Conservation Service work unit technician got together to plan a program of action. It was agreed that the first step should be a county-wide meeting of tractor owners and others who might be interested in constructing terraces through the AAA purchase order plan. This meeting was held early in January with approximately 150 tractor owners in attendance. After the county administrative officer discussed the general provisions and requirements of the program, the SCS technician explained some of the principles of terracing, including planning, running lines, and building terraces with tractors and other farm equipment. The county agent pointed out the great need for terracing in Anderson County and urged that farmers take advantage of the opportunity to get more terracing done while assistance was available through the AAA Program.

One of the big problems that came up at this meeting of tractor owners was the need for trained personnel to run terrace lines. Most of the young men and older boys who had run terrace lines in the past were now in the armed services or in defense work. When it was explained that schools and demonstrations would be held to train men to run lines and build terraces, there was immediate response. The next question was, how soon can you hold these schools? Before the meeting was adjourned, 25 farmers had signed contracts with the AAA to construct terraces under the purchase order plan and dates were set for a five-day terracing school to be held the following week. Several farmers placed orders for new terracing levels and these were on hand for the training school.

Terracing School. Interest among farmers at the terracing school was far beyond expectations. In spite of extremely cold weather, nineteen were in attendance from beginning to end. The interest and attitude of the AAA county administrative officer was a big factor in holding the interest of the farmers; he attended every session of the school. He not only learned himself but he tried to see that all others learned as well.

This paper was presented at the annual meeting of the American Society of Agricultural Engineers at Milwaukee, Wis., June, 1944, as a contribution of the Soil and Water Division.

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The actual teaching or instructional work at the terracing school was under the leadership of the local SCS work unit technician. The extension agricultural engineer assisted with instructional work during three days of the school. The text or subject matter material taught in the schools was that contained in our Extension Circular No. 251, "Terracing in South Carolina." Most of the subject matter of this circular is that adopted or recommended by the state engineering subcommittee. Membership of this subcommittee consists of (1) a representative of the Soil Conservation Service, usually a district conservationist or a zone technician; (2) the head of the agricultural engineering department at Clemson Agricultural College; (3) the state extension agricultural engineer, and (4) the extension conservationist who is a joint employee between the Extension Service and the Soil Conservation Service.

In addition to level work, i.e., setting up, checking, adjusting, measuring slopes, and running lines, considerable time was spent also in planning water-disposal systems on different farms. Visits were made to a number of farms having soil conservation district agreements. Here studies were made of terrace planning, water-disposal systems, and general land-use practices.

The proper training of inspectors who check terraces for compliance is, of course, a very necessary part of a successful terracing program. The Anderson County inspectors were required to attend all schools and assist in giving instructions or demonstrations.

Contractors' First Job. At the close of the terracing school, all the farmer contractors were told to go home and plan and survey a system of terraces on their farms or on a neighbor's farm. The terraces were to be marked out but construction should not start until one of the inspectors came by and gave his approval. This method proved very helpful as it gave the farmer opportunity to work out certain field problems by himself and then ask questions about some of the more difficult problems. The AAA inspectors have rendered a very worth-while service to the new or inexperienced contractors in helping them to get started on their first job. The inspectors draw their regular pay for this type of work and it is time and money well spent.

Terracing Demonstrations. Several of the farmer contractors in attendance at the terracing school had never seen terraces built with a tractor and disk tiller plow. It was then decided to hold some demonstrations for these contractors and invite all farmers of the county to attend. This would help to advertise the program and perhaps encourage other farmers to do terracing work under the purchase order plan.

Ten demonstrations were scheduled in different sections of the county. Two were held each day, one in the morning and one in the afternoon. All available means were used to advertise or announce the demonstrations. The AAA office sent notices to all farmers of the county. The local newspaper carried the announcement and gave the schedule. The county agent also made announcements over the radio and in various meetings.

Approximately 300 farmers attended these demonstrations which was an average of thirty at each demonstration. Here again the interest among farmers was beyond expectations. In practically every demonstration farmers expressed surprise that good terraces could be constructed so easily and economically. By keeping time on construction and knowing the length of terrace, it was of course an easy matter to determine the approximate wages that could be earned through AAA payments. In the series of 10 demonstrations held, terraces were constructed with several different makes and sizes of tractors and plows. In most cases the terraces were constructed with tractors and plows on the farm where the demonstration was held.

In holding these 10 community demonstrations, the SCS technician was in charge of terrace construction while the AAA men assisted in checking the terraces and explaining general provisions of the program. The county agent attended several of the demonstrations, but like most county agents he had work to do on other programs and could not attend all meetings.

Demonstrations Sell Program. The community terracing demonstrations really sold the AAA terracing program in Anderson County. As soon as the demonstrations started farmers wanted another school for running terrace lines. This was held immediately following the terracing demonstrations with approximately 30 farmers in attendance for a four-day school. This school called for more farm levels. To date 35 new terracing levels have been ordered for farmers' use since early in January, and 93 farmers have signed contracts with AAA. Only about 30 of these farmers, however, have been active in the terracing program. A number signed up for the program with the understanding that they would terrace for some of their neighbors, if time and weather conditions permitted. Unfortunately the weather was not favorable for much terracing activity this spring. A prolonged spell of rainy weather delayed land preparation and planting by at least 30 days. Had weather conditions been favorable, estimates are that at least 75 of the 93 farmers who had signed contracts would have done considerable terracing.

Even with unfavorable weather, the 30 active contractors have accounted for approximately 3,000,000 ft of terracing that was approved up to June 15, 1944. On average slopes of Anderson County, this amounts to about 5,000 acres, or an average of 160 acres per contractor. In order to keep up with the checking of terraces for compliance, it has been necessary for AAA to employ eight inspectors. Five of these men have been steadily employed. When they are not busy checking terraces or doing necessary office work, they are out in the field working with some of the new or less experienced contractors.

One of the features that has contributed to the success of the Anderson County program has been the good work of the inspectors. Many of us have seen or know of some of the troubles that come from the work of poor inspectors. I will not attempt to define a good inspector, except to say that he should know more about terracing than what the specifications call for or what is given in the bulletin. We have a few in South Carolina who fall into this classification.

GOOD INSPECTION ESSENTIAL TO SUCCESS OF PROGRAM

The Anderson County inspectors are required to be on hand when a contractor finishes up his first job, provided he has received at least two days' notice of the approximate time of completion. The purpose of this meeting of the contractor and the inspector is of course evident. It enables the inspector to point out to the contractor certain practices or weaknesses that need improvement, before he leaves the farm. Practically all the Anderson County contractors had their first job turned down. A prompt rigid inspection, however, put them on the right foot and prevented return trips to complete a lot of jobs. There have been no cases of contractors being dissatisfied with inspectors' decisions about incompleted or otherwise faulty terrace planning or construction.

Farmer Contractors Key Men in Program. Terracing alone of course does not furnish a complete soil conservation program, but it is the first step on sloping cultivated fields in South Carolina. This fact is recognized by the agricultural agency representatives in Anderson County. Plans are now under way to use the farmer contractors as key men or leaders to continue the terracing program and at the same time assist in establishing other soil conservation practices such as proper rotations, cover crops, etc. The Soil Conservation Service work unit technician tells me that, in his opinion, he will get far more farm agreements under a program of this kind than under the old method of getting agreements and then hoping the farmers will carry out the practices. This, to me, is a sound approach to the problem, i.e., first assisting the farmer with the problem in which he is most interested. In most cases this problem is terracing. If this job is done right in the beginning and if proper attention is given to maintenance, the groundwork is laid for a complete soil conservation program.

Speaking of terrace maintenance, this is a problem that should not be overlooked in a county terracing program. The Anderson County leaders have undertaken this problem in an organized way. The AAA and SCS representatives have prepared a joint letter that is sent to each farmer immediately after his terraces have been approved. This letter states that if these terraces are properly maintained they will be of great value as a permanent farm investment. Enclosed with the letter is a printed copy of South Carolina Extension Circular No. 254, "The Care and Maintenance of Terraces." Attention is called to the importance of following suggestions in the circular on methods of plowing terraces.

A series of 10 or 12 community terrace-maintenance demonstrations is planned for this fall. These will be located, in most cases, on farms of contractors. Following these demonstrations, plans are under way to hold small neighborhood demonstrations. These demonstrations will be supervised by AAA inspectors, farmer contractors, or any other person who has been trained under this program.

In conclusion, let me re-emphasize the two main points that have contributed to the success of the terracing program in Anderson County. First, the cooperation of agency representatives, and second, the training of farmer contractors or community leaders. All three of the agencies referred to have a definite part or responsibility in the organization of a terracing program. One of our main objectives should be to get maximum participation among farmers while funds are available. The training of farmer contractors or community leaders is necessary in this undertaking. After the terracing program is under way, these community leaders can then assist in the establishment of other soil conservation practices.

A Sheller for Seed Peanuts

(Continued from page 424)

Farmers' stock peanuts that contain considerable foreign material can be cleaned by feeding them through the recleaner arrangement as described for recleaning the shelled nuts. This operation removes practically all the trash and many of the stones and pays for itself in increased capacity of the shelling cylinder and reduction in percentage of broken or split peanuts.

Tests made this spring indicate that this sheller can be recommended for shelling the Spanish type peanuts for seed if the seed are disinfected immediately after shelling. There was no significant difference in germination between the machine and hand-shelled peanuts. The germination of machine-shelled and disinfected runner peanuts was below that for hand-shelled seed. This does not condemn the sheller for runner peanuts, however, as the high cost of getting seed hand shelled more than offsets the cost of the extra seed required to get a stand. Storing the machine or hand-shelled peanuts of either variety up to six weeks had no significant effect on germination.

SUMMARY

This sheller designed for handling seed peanuts does the job effectively and efficiently. It is simple in its construction and operation. It should be built at a relatively low cost, thus making it within the reach of nearly all peanut growers. The germination of Spanish peanuts shelled with this type sheller is equal to that for hand-shelled seed but one year's results indicate that the germination of runner peanut seed is lowered. In spite of the lower germination for the runner seed, it is more economical than getting the seed hand shelled.

Barn Curing of Hay with Heated Air

(Continued from page 423)

thereby making it possible to cure more hay with the system during the haying season. He expects to determine fully the advantages, if any, by comparing his system using the heat with the one without heat.

On the basis of our field experience with the forced ventilation system of curing hay, we do not believe that the use of supplemental heat can be justified on the average farm in Virginia. Should future studies show that the nutritive value of hay cured with heat is higher than that of hay cured more slowly without heat, the additional cost might be practical. It is also reasonable to assume that improved and lower cost methods of providing the heat could be developed where conditions are such that the use of heat is necessary and desirable.

Electric Lamps for Farm Lighting Requirements

By Lawrence C. Porter
FELLOW A.S.A.E.

FARMING is rapidly becoming a mechanized business and thus is taking its place as one of the great American industries. The lighting requirements for the farm industry are quite similar to those of many other industries. Lamps for farm use may be grouped into various classes. This paper is intended to give a general picture of the types and uses of various light sources applicable to present-day farming.

General Lighting Lamps. First of all come the lamps that are most commonly used for lighting the farm home. The majority of these are 115, 120 or 125-v tungsten filament lamps equipped with medium screw bases and designed to operate equally well on either a-c or d-c circuits. They are available in the following wattages: 6, 10, 15, 25, 40, 50, 60, 100, 150, 200, 300, 500, 750, 1000, and 1500. Detailed lighting recommendations for the farm are given in USDA Farmer's Bulletin 1838, "Electric Light for the Farmstead". Since this bulletin was written, however, fluorescent lamps have come into wide use in our great war factories, and after the war they will find many uses on the farm.

Next to general lighting for the home and outbuildings comes the use of floodlighting lamps to enable doing many outdoor chores at night; then the use of sunlamps and germicidal lamps in poultry production, the use of infrared both in the house and the barns, the use of lamps for plant growth, flashlights, handlanterns, etc.

Mercury Arc Lamps. As yet mercury lamps, with the exception of sunlamps, have not found wide application on the farm. There are six types of such lamps available for lighting purposes today. They are known as the H-1 (450 w), H-2 (300 w), H-4 (100 w), H-5 (250 w), H-6 (1,000 w), and H-9 (3,000 w).

All mercury vapor lamps require auxiliary equipment for providing suitable starting and operating voltages.

The mercury lamps emit a typical bluish green color of light and by themselves are not particularly well suited to general lighting, particularly where accurate color rendition of the objects viewed is essential.

Their outstanding advantages are high efficiency and a relatively concentrated source of light. Their efficiencies are 40 l (lumens) per watt for the H-1, 30 l for the H-2, 35 l for the H-4, 40 l for the H-5 and H-9, and 65 l for the H-6. The last mentioned lamp is a water-cooled lamp used primarily for projection and photographic purposes. The other lamps are used mostly in combination with incandescent lamps to provide some light in the red end of the spectrum for factory lighting.

Fluorescent Lamps. The basic difference between the fluorescent lamp and the older types of tungsten filament lamps is that, instead of having a white-hot tungsten filament in a pear-shaped or round bulb as a source of light, the fluorescent lamp is made in long tubular bulbs containing mercury vapor. The electric current passing through this vapor generates shortwave invisible ultraviolet. The ultraviolet falls on a chemical powder called a phosphor coated on the inside of the tube. This phosphor converts the invisible ultraviolet into visible light. The composition of the phosphor determines the color of the emitted light. These lamps require a ballast reactance and an automatic starting switch for their operation. Normally they are designed for operation on a-c circuits, but they can be adapted to d-c operation by the addition of suitable resistance in series with the ballast. Since the bulbs are long straight tubes entirely different types of fixtures are required than are used with incandescent lamps. It is not practical to convert an incandescent lamp fixture to use fluorescent tubes.

There are two outstanding advantages of the fluorescent lamp. First, it has a much higher efficiency than the tungsten filament lamp. For example, a 40-w gas-filled tungsten filament lamp, such as used for general lighting purposes, emits 465 l of light and has a rated average life of 1000 hr, whereas a 40-w fluorescent lamp emits 2100 l and has a rated average life of 2500 hr on intermittent service; considerably longer if burned continuously.

The other outstanding difference between the tungsten filament lamp and the fluorescent lamp is the fact that the latter emits very much less infrared or radiant heat per lumen of light than the former. This makes it possible to use much higher levels of illumination from fluorescent lamps without getting uncomfortably warm when working under them. Instead of 10, 15, or 20 ft-c (foot-candles) formerly recommended for tungsten filament lamps, good practice now dictates 50, 100 or even higher foot-candles with fluorescent lamps, which means less eye strain, easier seeing, faster work, fewer mistakes and less nervous fatigue.

Today standard fluorescent lamps, called Mazda F lamps, are available in 6, 8, 15, 20, 30, 40 and 100 w. They can immediately be used to good advantage in the farm home for lighting in the kitchen and laundry. After the war circular Mazda F lamps will probably be available for use in floor and table type reading lamps. Fluorescent lamps are also particularly well suited for use in the milk room of the dairy. They are not recommended for use in locations likely to be below freezing temperatures which make starting difficult.

Sunlamps. The purpose of a sunlamp is to provide the equivalent of the ultraviolet in summer sunshine to prevent rickets and build strong bones and teeth in birds and animals, as well as human beings.

There are four types of lamps suitable for that purpose, the S-1, S-4, RS-4 and RS lamps. All of these emit the so-called health rays or middle ultraviolet of 2967 A wavelength in approximately equal amounts. The first three require a transformer for their operation. The RS sunlamp will operate directly on any 110-125-v a-c circuit without the use of auxiliary equipment. (It is not designed for operation on d-c circuits.) The S-1 sunlamp and transformer consume 450 w, the S-4 and RS-4 lamps with their transformers consume 120 w, and can be used interchangeably on the same transformer. The only difference in the two lamps is that the RS-4 lamp is made in a reflector type bulb, whereas the S-4 requires an external aluminum or chromium reflector. Reflectors made of other materials do not reflect ultraviolet even though they are excellent reflectors of visible light. Since the S-4 and RS-4 lamps would burn out if screwed into an ordinary lamp socket they are made with oversized bases called admedium to prevent that. The RS lamp is made in a reflector type bulb and therefore does not require an external reflector. It has a medium screw base and may be screwed into any ordinary lamp socket. It consumes 275 w.

The principal advantage of the S-1 lamp is that it emits considerable heat with the ultraviolet. The fixture is large and clumsy weighing about 47 lb, as against 16 lb for the S-4 fixture (home type). The total cost of using an S-4 or an RS-4 lamp is almost the same and appreciably less than that of the RS lamp. For use with the S-4 and RS-4 lamps there is available a simple suspension type transformer with socket attached to the bottom.

For human use it is recommended that daily dosages be taken at a distance of about 2½ ft from the lamp. Exposures should start at 5 min duration and gradually be increased as one becomes accustomed to the ultraviolet up to an exposure that begins to produce sunburn. Goggles are not necessary with these lamps as the composition of the bulb is such as to transmit none of the shortwave radiation that causes sore eyes. In other words, the ultraviolet output is simply the equivalent of midsummer noonday sunlight which at 2½ ft from the lamp is about three times as intense as that of sunlight. At 5 ft it is about equal to sunlight, and at that distance exposures of 15 min may be used to start with.

In poultries the lamps should be suspended about 3 ft above the mash hoppers or waterers and the lamps burned 1 to 3 hr per day, preferably at feeding time.

The ultraviolet from all of the sunlamps decreases somewhat with age. This can be offset by shorter exposure distances or longer burning periods.

A contribution of the Committee on Electric Light in Farm Production of the American Society of Agricultural Engineers, June 1944.

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The life of the lamps depends upon the number of times they are lighted as well as upon the total hours burned. Under average home use one lamp should give approximately 2 years service (400 starts). In poultry use one lamp should give approximately one year of service.

Where lamps are used for poultry services the use of cod-liver oil or other sources of vitamin D in the feed may be discontinued.

The use of sunlamps eliminates all fish oil taste in the flesh of the birds, prevents rickets, reduces mortality, promotes faster growth, and gives greater vitamin D potency to the eggs as well as increasing egg production.

Infrared Lamps. Infrared is another term for heat, but applies to that emitted by any heat source as radiation rather than that transmitted by conduction or convection.

Any incandescent lamp is a source of infrared. As a matter of fact, approximately 90 per cent of the energy or watts consumed by a lamp is converted to heat of which about 82 per cent is infrared.

Infrared radiation, like ultraviolet, covers a wide range of wavelengths, from approximately 7500 to 50,000 A. The shorter waves are known as near infrared. Then comes middle, and the longest waves are called far infrared. The near infrared will penetrate water and human flesh more deeply than the longer heat waves, and is therefore most effective for the relief of congestion and pain. The longer waves penetrate paints and lacquers most readily and are therefore selected for drying purposes.

There are four types of lamps that have been widely used primarily as sources of infrared. The oldest of these is the carbon filament lamp used primarily for therapeutic purposes in the home.

Next come the 60, 250 and 500-w Mazda CX lamps. These are high efficiency gas-filled tungsten filament lamps. They operate directly on the 110-125-v lighting circuit either a-c or d-c without the use of transformer or ballast. In addition to infrared they also emit a small amount of ultraviolet and for that reason have been used to some extent in poultries. They should be equipped with aluminum reflectors and for poultry purposes burned approximately 8 hr per day. This long hour burning period resulting in relatively high operating cost has resulted in their gradual replacement by S type sunlamps for poultry and dairy use.

For therapeutic purposes they are probably the most effective heat lamps available and they are in wide use in homes and hospitals. Equipped with concentrating type reflectors they are applied to sore muscles, strains, sinus and ear difficulties, and other uses where the physician prescribes the application of heat. They are usually used as close to the body as practical with comfort and burned anywhere from 5 min to an hour per application. The short-wave infrared they emit penetrates deeply into flesh.

CX lamps have one disadvantage, i.e., their high brightness. This makes them rather uncomfortable, on account of glare, to use on the front of the body. To eliminate that difficulty a low brightness type of lamp known as the 250-w R-40 heat lamp was developed. True, there is no ultraviolet in the output of this lamp, and the infrared is of considerably longer wavelength, hence does not penetrate so deeply as that from the CX lamps. This, however, can be largely offset by longer exposures. The lamp has the outstanding advantage of being made in a reflector type bulb. That makes it possible to use the lamp in almost any existing fixture or even on a drop cord. Tarnishing of external reflectors is eliminated and a high percentage of the energy emitted by the lamp is concentrated into a relatively small area.

Probably the most widely used infrared lamp is the 250-w R-40 drying lamp. The only difference between this lamp and the heat lamp is higher filament temperature. This results in the emission of infrared of a peak wavelength that most readily penetrates paints and lacquers for quick drying. These lamps are very extensively used in industry. They are also satisfactory lamps for therapeutic purposes, though their brightness while well below that of the CX lamp is still uncomfortably glaring.

Other sizes of drying lamps that are available are 100 to 500 and 1000 w.

The reflector bulb lamp enables many farmers to make a simple successful homemade brooder during the war when commercial brooders were scarce and other types of heat sources, such as nichrome resistance wire, were not available. Various combinations of reflector bulb lamps can be used in the homemade brooder. Probably the most effective is one 250-w R-40 heat lamp and one 150-w R-40 flood lamp inside the brooder, and one 250-w R-40 heat lamp suspended approximately 3 ft above the feeding area just outside of the brooder. The combination of a 150-w and a 250-w lamp inside of the brooder enables the use of three degrees of heat by burning either or both lamps. The use of the supplemental lamp over the feeders outside of the brooder coaxes the baby chicks out to eat and prevents them from becoming chilled when coming out from under the warm brooder into cold outside air and onto a cold floor.

Heat lamps are also very effective in treating animals, much more so than the use of hot wet rags as the latter in cold weather may leave the animal wet and subject to pneumonia. Infrared lamps are also very useful in baby pig and lamb brooders, for heating hotbeds, for dehydration of food, for supplemental heating in the home, for fruit ripening, clothes drying, water warming, pipe thawing, seed drying, relief of conjunctivitis, automobile starting, etc.

Reflector Type Bulbs. By evaporating a small amount of aluminum inside of an evacuated bulb a very thin highly polished aluminum coating is deposited on the inner surface of the bulb. This acts as a highly efficient reflector of visible light, ultraviolet, and infrared radiation.

The reflector type bulb eliminates the necessity of an external reflector and requires about 1/10,000 the amount of aluminum. The internal reflector has the further advantage that it does not tarnish or get dirty. It is a very efficient means of collecting most of the energy emitted by the lamp and filament and delivering it where it is needed. Elimination of an external reflector permits close spacing of the lamps and thus a high concentration of energy per square foot — a great advantage in some of the industrial drying processes.

The spread of the light, or ultraviolet or infrared beams from the lamps, is controlled by the shape of the bulb and by the configuration of the glass on the end. In the automobile headlamp, for example, very definite patterns are produced for the most effective road lighting with minimum glare in the approaching driver's eyes.

For general lighting there are two beam spreads available—one of about 60 deg produced by the projector and reflector flood lamps, and the other approximately 30 deg produced by the projector and reflector spot lamps. Sunlamps and infrared lamps are made only with the flood type beam.

The flood type bulbs have the glass inside frosted before they are aluminized. That gives them the milky white appearance and helps to spread light uniformly over the 60-deg beam. The spot type bulbs are not inside frosted, hence they have the polished aluminum appearance.

The flood and spot type lamps for general lighting are made in two types of bulbs. One is known as the projector, or PAR-38 bulb. This is made of heavy heat-resisting type of glass and may be burned out-of-doors without danger of cracking when cold water strikes the hot bulb. The other is known as the reflector or R-40 bulb. That is made of thin soft glass and is likely to crack if cold water hits the bulb when the lamp is lighted. These bulbs are designed for indoor use.

Germicidal Lamps. The newest thing in the lamp line for poultry work is a line of germicidal lamps — 8, 15, and 30-w. These consist of tubes made of very special glass to transmit shortwave or far ultraviolet. The tubes contain a small tungsten filament at each end and some mercury vapor. The function of the filaments is to emit electrons and start an electric arc discharge through the mercury vapor. After the arc starts the filaments are automatically turned off. A reactance type ballast and a starting switch are necessary for the operation of the lamps. These are generally incorporated in a single unit or fixture, together with two sockets to hold the lamp. The fixtures come both with and without reflectors.

Polished aluminum makes the best reflector for germicidal lamps, but due to war conditions chromium-plated steel is temporarily being used for that purpose.

Approximately 95 per cent of the energy emitted by these lamps is at the single 2537 A wavelength. Radiant energy of this wavelength is very effective in killing germs. A surprisingly small amount of such energy will free the air of germs and thus reduce the spread of air-carried diseases, (Continued on page 430)

National Roster of Scientific and Specialized Personnel and Fields of Agricultural Engineering Specialization

THE National Roster of Scientific and Specialized Personnel is the division in the Bureau of Placement of the War Manpower Commission charged with the responsibility of obtaining the most effective utilization of professional and scientific personnel during the war period. When established in June 1940, it was set up under the joint auspices of the U. S. Civil Service Commission and the National Resources Planning Board, because at the time it was believed that the federal government would be the principal user of the specialized personnel that would register with the Roster. It soon became apparent, however, that the need for these specialists would be greatest in industry and the armed forces, and accordingly when the President by executive order established the War Manpower Commission in April 1942, he set forth in that order that the National Roster should be transferred from the Civil Service Commission to the War Manpower Commission. From the very beginning, Dr. Leonard Carmichael, president of Tufts College, has been director of the Roster.

The National Roster's principal task has been to register, recruit, and place professional and scientific personnel in those jobs in which they could best aid the war effort. At present, the Roster has registered and maintains in its records the education, experience, and training backgrounds of approximately half a million of the country's professionally qualified individuals. The data in these records are kept current by the Roster's practice of recircularizing its registrants annually. The data obtained in this manner enable the Roster to carry on such important functions as (1) the gathering and analysis of statistics to determine the characteristics and employment distribution of the various professions, (2) the making of studies of supply and demand in the important professions, (3) the publication of vocational guidance pamphlets in these professions, (4) the preparation of descriptions and definitions of the professions and their fields of specialization, and (5) the provision of a free public placement service for the professional and scientific personnel of the country.

In performing its placement service, the National Roster carries on two types of activities: first, the recruitment of personnel to fill specific jobs for which orders have been placed; and second, positive placement designed to locate suitable positions for individuals who have indicated that they are or will soon become available for employment. The Roster receives job orders from private industry either directly or through the U. S. Employment Service, from federal agencies either directly or through the U. S. Civil Service Commission, from the Army and Navy for military personnel usually to be considered for commissioning, educational institutions, and state and local governments. When a job order is received, a search is first made of papers maintained in a special file in which are contained brief statements of qualifications of individuals who have indicated that they are actively seeking employment or a change in employment. If the order cannot be filled from this source, a machine run is made from the Roster's punch-card records and qualified registrants are selected. The detailed records of these registrants are then examined to make certain that they possess the necessary qualifications and also to determine if the transfer would be in the interest of the war effort. As a result of this examination, a number of registrations are tentatively selected for referral. In most cases, these registrants will be employed in war jobs and it is important to determine their availability for transfer.

The Roster's procedure is to write the registrant's employer, indicate the nature of the war job which has to be filled, and ask the employer whether he can grant his employee a release. Most employers are patriotic and if they believe the job to be filled is more important to the war effort than the job the employee is performing, they will agree to release him. The employer will give to his employee a form sent to him by the Roster on which there will be a brief description of the job in question and the employee will be asked to indicate on this form whether he is interested in being considered for transfer. In the event he notifies the Roster of his willingness to be considered for the position, his entire record would then be referred to the establishment which has placed the job order with the Roster. This establishment will then deal directly with the registrant. Should the employer be a federal agency, the papers will be referred through the U. S. Civil Service Commission; referrals to industrial establishments are made through the U. S. Employment Service; referrals to the Army and Navy for military assignments and to colleges and universities are made directly.

Professionally qualified persons may write the Roster that they are seeking employment or they may register with the nearest local office of the U. S. Employment Service which will in turn notify the Roster. The Roster and the U. S. Employment Service have developed working relationships which make it possible for the local office to refer job orders and job applicants quickly to the Roster are checked, and if the individual is qualified, his papers Roster. Upon receipt of such notice, all current job orders in the are immediately referred for consideration. If there is no current job order for which he is qualified, a search is made through prior orders and other information which the Roster has on hand to locate establishments where individuals with such qualifications have been employed. When these have been located, a record of the registrant's qualifications is sent to those employers for consideration. In effect, the Roster solicits jobs for these people. If neither of the above steps produces results, a brief record of the individual's qualifications is transmitted to a few selected local U.S. Employment Service offices which are requested to inquire among employers in their respective areas for possible employment.

The Roster's placement and other activities have at all times been performed with the cooperation and assistance of the national professional and technical societies. Through the procedures it has set up, as well as through cooperative arrangements with other placement services, the Roster has been rendering on a national scale to trained professional and scientific personnel the same services that the local employment offices throughout the country have been rendering on a local basis to a much greater number of workers with less education, experience, and training. Because of their relatively small number and also because of their relatively high degree of mobility, this centralized placement service has been found to be the most effective method of dealing with professional and scientific personnel.

(EDITOR'S NOTE: The foregoing description of the activities of the NRSSP was prepared by the Roster office in Washington at our request.)

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The following statistics have been prepared by the NRSSP on the distribution by extent of education and age of agricultural engineers registered with the National Roster. As of October 1, 1944, 762 agricultural engineers have been registered with the Roster. Incidentally, 43 of these were in the armed forces, and the Roster records show no women in this field. Following is the distribution of agricultural engineering registrants by age groups: Ages 20 to 29, 179; 30 to 39, 293; 40 to 49, 174; 50 to 59, 82; 60 and over, 34. The median age is 36.9. Following is the distribution by extent of education: Ph.D, 8; master's degree, 147; bachelor's degree, 513; 4 years of college (no degree), 21; others, 73.

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The handbook of descriptions which the National Roster has prepared on the specialized fields in agricultural engineering is of particular interest. It contains the description of the usual or typical activities of technical personnel working in each of the fields of specialization in agricultural engineering. The term "field of specialization" as used in this handbook denotes a well-defined occupational area within the profession. It is the particular type of work performed by a substantial number of agricultural engineers.

The original draft of the descriptions for this field was prepared in the National Roster office from such sources as job descriptions, textbooks and encyclopedias on this occupational area. This draft was distributed to a number of specialists in the field. These men, each with considerable experience in industry, government or education, were asked to review, criticise, and, if necessary revise the description or any part thereof. The returns were analyzed and many valuable suggestions were incorporated in the final draft.

The occupational summary of the handbook contains this definition and the five major divisions of the field: "Agricultural engineering involves the application of the principles of engineering and of agricultural science, as well as of chemistry and physics, to problems of agriculture. This branch is divided into five major divisions: (a) rural electrification, (b) agricultural machines and power, (c) farm structures and utilities, (d) processing of farm products, and (e) soil and water conservation."

The functions in which an agricultural engineer may specialize are listed as follows:

0 Extension work — field demonstration and educational work performed by agricultural engineers employed by states, counties, federal government, machinery and materials manufacturers and power companies.

1 Research in development of new equipment, machinery, and structures; in soil and water conservation and rural electrification; and in techniques for agricultural production and processing.

2 Design — farm equipment, structures, processing equipment, utilities, and appliances.

3 Editing and writing along pertinent technical lines.

4 Supervision of construction of farm structures and utilities, and of production of processed agricultural products.

6 Teaching at the college or university level.

7 Management of mechanical equipment manufacturing plants, and of rural electrification and soil conservation programs.

9 Sales, service and distribution of machinery, rural electric power and electric appliances, structural materials, agricultural product processing equipment. Includes maintenance, repair, and efficient use of these.

FIVE MAJOR DIVISIONS OF SPECIALIZATION

Following are the descriptions of specialization in the five major divisions of agricultural engineering as given in the Roster handbook. The handbook points out that the work of the agricultural engineer is related to other specialties in other branches of engineering and in other sciences, and some of the important fields to which there is a degree of transferability are listed in connection with each description in the Roster handbook; for lack of space, however, these related fields will not be included in this resume.

Agricultural Machines and Power. This specialty includes the design and the development through research, the manufacture, and demonstrating the proper use of: (a) farm field machines for tillage, weed control, planting and seeding, insect and plant disease control, harvesting and other field practices; (b) crop processing and handling machinery such as corn shellers, feed grinders, silage cutters, etc.; (c) drainage and irrigation machinery; (d) equipment for stump and stone removal; (e) internal-combustion engines and accessories as a source of farm power; (f) tractors and other transport equipment, and (g) care, repair, and maintenance of mechanical farm equipment.

Farm Structures and Utilities. This specialty deals with research and the planning, design, arrangement and construction of farm buildings and structures, including dwellings, and their adaptation to specific regions, types of farming and economic conditions.

The engineer is concerned with structures as functional units that provide adequate dwellings for farm operators and efficient animal housing, crop storage, shelter for supplies and equipment, and facilities for handling and processing agricultural products.

This specialty also includes the development, design, and proper use of equipment and utilities in farm buildings. It involves the requirements of the farmstead with respect to arrangement, fencing, water supply, sanitation and sewage disposal. The design of prefabricated structures and special types of buildings for feed handling, milling, dehydration and refrigeration are enigneering activities for this subdivision.

Objectives in farm structures engineering are the improvement of environmental conditions, cost economy, adequate structural qualities, labor use efficiency, and the conservation of feed, stored products and animals. Training and experience in agricultural production, economics and architecture are helpful in problem solution and close collaboration with specialists in these related fields is helpful.

Soil and Water Conservation. This specialty deals with research on and the engineering design, layout, construction and maintenance of structures, and measures for soil erosion control and for water conservation, use, management, and disposal as related to agricultural lands.

Soil erosion control involves preventive and corrective structures and measures as terraces, diversions, waterways, furrows, ridges, check dams and flumes.

Water conservation includes the holding of water on the land by contour cultivation, ridges, furrows, and pit or basin cultivation, and the impounding of water in ponds or reservoirs.

Irrigation involves the pumping of water from wells or its diversion from streams or reservoirs; measuring water and delivering it to farms; and development and use of efficient methods of applying water. Consideration must be given to topography, land use capabilities, the quantity and quality of water available, and the economic feasibility.

Drainage is essential in most irrigated areas; is needed to achieve maximum production from cultivated lands with poor surface or internal drainage; and may make possible the reclamation of inherently productive lands now in swamps or marshes, where this is economically feasible. Drainage may require the improvement of natural streams, or the use of open ditches, tile, pumping, or combinations of these methods as required by topographic, soil, or cultural factors, and of appurtenant structures.

Flood control for the protection of agricultural lands involves the improvement of vegetative cover, the retention of water by conservation structures and measures, the detention of water in flood control reservoirs, and the use of diversions and levees.

All of these activities require the application of engineering knowledge and procedures to the solution of agricultural problems, in collaboration with other engineers and agricultural technicians.

Rural Electrification. This specialty involves research and includes design and layout of wiring and lighting for farmsteads and farm buildings; productive uses of power, light, heat, ultraviolet and other forms of electric energy in agriculture; the design, construction, testing, installation, operation, care and repair of electrically powered, heated, lighted, energized or controlled farm equipment and processes such as chick, pig and lamb brooders, milk coolers, milking machines, elevators, feedmills, electric fences, insect traps, equipment sterilizers, water systems, water heaters, etc.; the design, testing, construction and installation of major items of household equipment such as food dehydrators, refrigerators, clothes dryers, heating devices, etc. Much of the work in this relatively new field has consisted in the construction, development, introduction and economic study of electrical farm equipment.

Processing of Farm Products. This specialty deals with the application of engineering methods, equipment and machinery to the *processing on the farm* of various types of crops and animal products. It includes research, design, manufacture and application of special processing equipment for pasteurization, dehydration, canning, milling, freezing, cleaning, storing, conveying, curing and grading for all types of crops, including dairy products, animal products, seeds, grain, poultry and fruit.

The Roster handbook lists the following collaborators who assisted in preparation of the final draft of the description of specialized fields in agricultural engineering; Dr. R. W. Trullinger, assistant chief, Office of Experiment Stations, U. S. Department of Agriculture; Howard Matson, chief, engineering division (Region 4), U. S. Soil Conservation Service; D. G. Carter, professor of farm structures, University of Illinois; W. B. Jones, Western Advertising Agency; Geo. W. Kable, editor, "Electricity on the Farm"; Dr. J. B. Davidson, head, agricultural engineering department, Iowa State College, and Raymond Olney, secretary, A.S.A.E.

Electric Lamps for Farm Lighting Requirements

(Continued from page 428)

particularly of the respiratory type. A single 30-w lamp will free 4000 cu ft of air of germs to the same extent that 100 changes of air per hour would do.

Thousands of these lamps are in use in hospitals, army and navy barracks, schools, offices, factories, and even in private homes. There is no reason why the lamps should not be just as effective in poultries as in human habitations, though their method of use will have to be modified somewhat to meet poultry conditions.

For human use the lamps are placed in fixtures mounted 7 to 8 ft above the floor on the walls. These units are so designed as to irradiate the upper air in the rooms but to cut off all radiation from below the level of the fixtures. That is for the reason that germicidal radiation falling in the eyes of either human beings, birds, or animals may cause sore eyes, and if enough of it falls on bare skin may cause sunburn. Either natural circulation or forced draft is depended upon to circulate the air from the lower part of the room up into the irradiated portions. The lamps are also used in the ducts of air conditioning systems. Sometimes a combination of the two systems is used.

Obviously sidewall fixtures would not be practical in the poultry on account of the dust problem and often low head room at the wall. It seems that it might be practical to mount bare tubes underneath waterers, feeders, roosts or nests, and use a baffle beneath the lamps. This would confine the radiation to a relatively narrow sheet above the heads of the birds on the floor and below those on roosts or in nests. There also is some indication that where bare tubes are mounted 6 ft or more above the floor the intensity on the birds is not sufficient to cause serious eye trouble. More research and experimental work is needed to establish the best method of using germicidal lamps in a poultry and determining what advantages will result from such use.

NEWS SECTION

Barn Hay Curing Conference

AS previously announced, the Southeast Section of the American Society of Agricultural Engineers, in cooperation with the Society's Committee on Hay Harvesting and Storage, is sponsoring a three-day conference on barn hay curing to be held at the Andrew Johnson Hotel, Knoxville, Tenn., December 6, 7, and 8. Nonmembers as well as members of the Society interested in the subject in conference will be welcome.

The entire first day of the conference, December 6, will be devoted to two tours to see hay drier installations. The first tour will leave the Andrew Johnson Hotel at 9:30 a.m. to visit two installations where the driers are operated by propeller fans, one utilizing gasoline engine heat. The second tour will leave from the same place at 1:30 p.m. to visit two installations using centrifugal type fans.

It is important that those planning to take these tours notify C. J. Hurd, chief, agricultural engineering development division, Tennessee Valley Authority, Knoxville, by December 1.

All program sessions of the conference will be held in the ballroom of the Andrew Johnson Hotel. The forenoon session of December 7 will open with a welcome by Ray Crow, chairman of the A.S.A.E. Southeast Section, following which C. E. Seitz, chairman of the Section's hay curing committee, will explain the purpose of the conference and announce the appointment of committees and committee meetings. The remainder of the session will be devoted to round-table discussions on the principles of barn hay curing, at which R. H. Driftmier, president of A.S.A.E., will preside. The afternoon session will be a continuation of the forenoon round-table discussions, and the principal subjects to be discussed at both sessions will include duct system design for loose hay, operation and management, use of artificial heat, drying chopped hay, drying baled hay, and hay quality. The program lists a group of about twenty experts on the subject of the conference who will participate in these discussions.

A meeting of the Committee on Hay Harvesting and Storage is scheduled for the evening of December 7.

The forenoon session of the third day of the conference, December 8, at which Geo. W. Kable, a past-president of A.S.A.E. and editor of "Electricity-on-the-Farm," will preside, will open with a summary of the first day's discussions by C. E. Frudden, consulting engineer of the Allis-Chalmers Mfg. Co. The rest of the session will be devoted to a round-table discussion on equipment, led by representatives of manufacturing organizations. The equipment to be discussed will include fans, motors, magnetic starters, time switches, etc.

The afternoon session at which M. M. Johns, rural electrification specialist, Tennessee Agricultural Extension Service, will preside, will be devoted to round-table discussions on educational and field plans in which representatives of extension services, power distributors, etc., and other agencies working with farmers will participate.

Pennsylvania Section Meeting

THE Council of the American Society of Agricultural Engineers having recently approved a petition for the organization of the Pennsylvania Section, a meeting of members of the Society in that state will be held in the agricultural engineering building at Pennsylvania State College, State College, on November 16, to formally organize the Section.

The forenoon program includes a short business session for the purpose of organizing the Section including election of officers. Following this the remainder of the session will be devoted to a panel discussion on soil conservation, R. L. Caulkins and W. C. Gumbell of the U. S. Soil Conservation Service and E. W. Schroeder of Pennsylvania State College constituting the panel of experts.

A special luncheon is being arranged for the group at the Nittany Lion Inn, at which Ladd Haystead, agricultural consultant of Fortune Magazine, will be the speaker.

The afternoon program will feature a panel discussion on mow curing of hay, J. B. Stere of West Penn Power Co., D. C. Sprague of Pennsylvania State College, and R. A. Blackburn of the Robinson Ventilating Co., constituting the panel of experts. This will be followed by a demonstration and discussion of the electric fence, led by Gil Cross of the Cooperative G.F.L. Farm Supplies, Inc.

Sponsor-in-chief for the Pennsylvania Section is R. U. Blasingame, a past-president of A.S.A.E., and head of the agricultural engineering department at Pennsylvania State College, whose initiative was largely responsible for the organization of the North Atlantic Section of the Society in April 1925.

A.S.A.E. Meetings Calendar

November 16 — Pennsylvania Section, Agricultural Engineering Bldg., Pennsylvania State College, State College, Pa.

November 30 — Washington (D.C.) Section, Room 3106, South Agriculture Bldg., Washington.

December 6, 7 and 8 — Barn Hay Curing Conference (sponsored by Southeast Section), Andrew Johnson Hotel, Knoxville, Tenn.

February 19 and 20 — Southeast Section, Piedmont Hotel, Atlanta, Ga.

Washington Section Activities

AT A meeting of the Washington (D.C.) Section of the American Society of Agricultural Engineers, held in the South Building of the U. S. Department of Agriculture at Washington, October 18, the following officers were elected to serve during the 1944-45 term: W. D. Ellison, chairman; E. M. Dieffenbach, vice-chairman, and D. B. Krimgold, secretary-treasurer.

At this meeting Dr. R. E. Hodgson of the USDA Bureau of Dairy Industry gave a very informative talk on feeding dairy cattle field-harvested roughages. Also, representatives of the Fox River Tractor Company showed a colored motion picture which illustrated the field operation of their new field roughage harvester.

At an informal luncheon on October 30 of officers of the Section and other A.S.A.E. members in Washington, the following general objectives for the Section were agreed upon:

1 To utilize fully the unique opportunities for exchange of views and of information on subjects related to agriculture and agricultural engineering on the highest national and international levels.

2 To provide a forum for discussion of specific problems and of current and proposed agricultural programs and of their effect upon the profession and upon the activities of the Society.

3 To keep in close touch with the officers of the Society and inform them of the activities of the Section and of such developments as may be of interest to the Society as a whole, or to any of its several divisions. Also to help the Society and its divisions and sections obtain such information and make such contacts as may be needed in their work.

4 To establish relations with local chapters of professional and scientific societies with a view to strengthening and furthering the status of the American Society of Agricultural Engineers.

5 To provide for closer social contacts among members of the Washington Section.

It is proposed to achieve these objectives by a series of nine monthly meetings and one social function, by establishing contacts with officials of other technical and scientific societies in Washington, and by close contact and exchange of information with the national headquarters of the Society.

Two of these meetings will be for the purpose of acquainting the membership with the broad problems of agriculture in various parts of the world. An attempt will be made to secure qualified speakers through the USDA Office of Foreign Agricultural Relations, UNRRA, and through embassies and purchasing missions of other countries. Such talks and discussions will enable the membership to compare problems, methods and procedures in this country with those of other countries and will acquaint the group with agricultural engineering problems and opportunities in other lands.

One meeting will be devoted to the program of the USDA Agricultural Research Administration. Trends in agricultural science, production and economics will be the subject of another meeting. An attempt will be made to arrange for visits by the officers of the Society, and one of the meetings will be set aside for welcoming them and discussing Society affairs. The four remaining meetings will be devoted to the fields of water, farm machinery, farm structures, and rural electrification. Important developments in each of these fields and their relation to and effect on the other fields will be featured at these four meetings.

Sometime during the year a social get-together in a form of a picnic, barn dance, fish fry, boat ride, or *(Continued on page 438)*

TESTS PROVE EFFECTIVENESS of Texaco Rustproof Compound

TEXACO RUSTPROOF COMPOUND will preserve the sharp cutting edges of disks, keeping them free from rust while they are not in use, even if the machinery is left outdoors.

In a test conducted at a State Agricultural College, Texaco Rustproof Compound preserved intact the fine land polish of a moldboard plow for over a year and a half! The plow was left outdoors continuously throughout this period and was exposed to wind, rain, snow and hail.

Other materials often used by farmers as "rust preventives" — such as crankcase and transmission oil, axle grease and chassis lubricants — failed to give protection after short periods, in similar tests at the College.

Crankcase and transmission oil prevented rusting only from 7 to 30 days, depending on the weather.

Axle grease and chassis lubricants prevented rusting from 60 to 90 days, depending on the thickness of application.

On the other hand, Texaco Rustproof is effective even when a thin film is applied. It can be applied on damp surfaces with good results. Brushed on rusty metal, it penetrates the rust, loosening it so that the rust can be removed easily, after which a second coating will keep rust off.

Farmers who have been putting Texaco Rustproof to practical tests on their machinery, report without exception, that this new Texaco product is most effective and very economical to use. It is easy to apply — and is easily removed, by washing the surface with kerosine. It is non-injurious to livestock.

Texaco Rustproof is available through Texaco men in all 48 states. For further information, write the nearest Texaco office listed below.

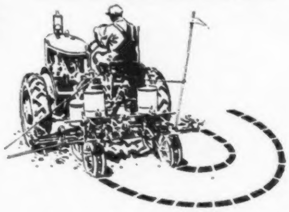
THE TEXAS COMPANY

WIN THE WAR ON WEAR WITH TEXACO PRODUCTS FOR THE FARM

DISTRICT OFFICES: Atlanta 1, Ga.; Boston 17, Mass.; Buffalo 3, N. Y.; Butte, Mont.; Chicago 4, Ill.; Dallas 2, Tex.; Denver 1, Colo.; Houston 1, Tex.; Indianapolis 1, Ind.; Los Angeles 15, Calif.; Minneapolis 2, Minn.; New Orleans 6, La.; New York 17, N. Y.; Norfolk 1, Va.; Seattle 11, Wash.

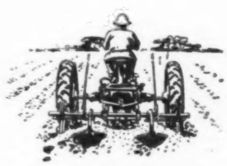
FROM EVERY ANGLE

WITHOUT THESE BASIC FEATURES NO MACHINE QUALIFIES AS AN ALL-PURPOSE FARM TRACTOR

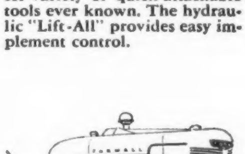


A SHORT TURNING RADIUS is vital for row-crop farming. Farmalls A and B turn in 10 feet. Tricycle design, and individual wheel brakes that enable operator to pivot on either rear wheel, are indispensable features.

AMPLE CROP CLEARANCE is required for cultivating. Farmalls have up to 30 inches vertically and a wide range of rear wheel spacings horizontally. Low pressure tires increase traction and decrease soil packing. On every job the operator has a clear view of the work he is doing.



THERE IS NO SUBSTITUTE for the Farmall's versatility. It is built to operate with the greatest variety of quick-attachable tools ever known. The hydraulic "Lift-All" provides easy implement control.



POWER MUST BE PROPERLY APPLIED for efficient tractor operation. Farmall's correct gear ratios mean low fuel consumption. A governor controls operating speeds. Oil and air cleaners and dirt seals insure long wear. The power take-off and belt pulley complete the Farmall's unbeatable utility as an all-purpose farm power unit.

FARMALLS ARE FIRST

ANY MAN WHO BUYS A TRACTOR buys it for one big reason: *the work the tractor will do.* The quality of work, the volume, and the variety are the real measures of tractor value. Couple these factors with original cost, plus upkeep and operation, and you have the whole story.

That's the way most farmers figure it out when they make this important investment. *The answer has turned out to be a Farmall tractor more times than all other makes combined.*

That doesn't happen by chance. It happens because these famous red tractors are designed and built to do more work, better work, and a bigger variety of work per dollar of cost than anything else on wheels.

At the right are a few basic reasons behind Farmall tractor performance. The McCormick-Deering dealer will be glad to demonstrate how Farmalls, with their complete line of related tools and machines, make up the most efficient system of power farming in existence. . . . Those are the big things to remember when you plan the purchase of farm power equipment.

With all possible manufacturing speed,

THE FARMALLS ARE COMING!

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BLITZ

on the FARM FRONT

Congratulations, Massey-Harris, on a big idea splendidly converted into action . . . The accomplishments of the Massey-Harris Self-Propelled Harvest Brigade will rank high in the story of Food for Victory . . . To have played a small part in your achievement is a source of deep gratification.

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SUBSIDIARY OF KELSEY-HAYES WHEEL CO.
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Wheel Builders Since 1888

NEWS SECTION

(Continued from page 432)

or whatever strikes the fancy of the membership, will be arranged to provide a real opportunity for those who desire to get better acquainted. Each of the meetings and the social function will be in charge of special committees whose responsibility will be to select the speakers and to conduct the meeting. Chairmen of these committees are being appointed so that the programs of the several meetings may be arranged and published in advance in AGRICULTURAL ENGINEERING. All members of the Society who happen to be in or near Washington at the time of any of these Section meetings are cordially invited to attend.

The chairman for the November meeting of the Section, S. P. Lyle, has completed his assignment. This meeting will be held at 2:00 p.m., November 30, in Room 3106, South Agriculture Building, Washington, D. C. Dr. E. C. Auchter, administrator, Agricultural Research Administration, U. S. Department of Agriculture, will speak on "The Program of the Agricultural Research Administration".

George Kreiger, chairman for the Section's December meeting, has secured Wheeler McMillen, editor of "Farm Journal" and president of the National Farm Chemurgic Council, who will talk on trends in agriculture. The title of Mr. McMillen's address and the time and place of the meeting will be announced later.

Farm Structures School

THE department of agricultural engineering of the University of Illinois conducted an intensive one-week farm structures school at Urbana, October 23 to 28. This school was arranged in response to the request of a number of representatives of manufacturers of farm building materials and equipment. Its primary purpose was to assist farm building field men and others interested in farm structures, but who were not fully familiar with the various aspects of farm building requirements, economics of farm building, building plan services, and the relation to farm production in general.

The course consisted of two lectures and two discussion periods each morning, a special study of production methods and structures requirements each afternoon, and a seminar each evening. The lecturers consisted of faculty members of the University of Illinois who are specialists in poultry, dairy, cattle, and hog production, agricultural economics, home economics, and agricultural engineering. Lecturers from the agricultural engineering staff and the subjects handled by each included R. C. Hay, extension methods and farmer contacts; E. W. Lehmann, rural electrification, utilities and farm safety; Keith Hinchcliff, planning, charts, blueprints and models, Leo E. Holman (USDA), crop storage, and D. G. Carter, building relationship and adaptation, planning services, and research.

The University made no charge for the course aside from a nominal fee of $2.50 per student. About 40 men from industry were enrolled for the course.

The department of agricultural engineering is laying plans for a somewhat similar school for lumber dealers to be held during the first part of December.

Tennessee State Section Meeting

THE Tennessee State Section of the American Society of Agricultural Engineers will hold its fall meeting in Knoxville on Saturday, December 9. This meeting follows immediately the conference on barn curing of hay, sponsored by the Society's Southeast Section in cooperation with its Committee on Hay Harvesting and Storage to be held at Knoxville on December 6, 7, and 8.

The meeting will convene at 9:30 a.m. and close promptly at noon. It will be opened with a short business session for the election of officers. The presentation and discussion of two papers will follow, one by Dr. Eric Winters of the University of Tennessee on the potentialities of various soil provinces of Tennessee, and the other by E. L. Edwards of the U. S. Soil Conservation Service on drainage problems in western Tennessee. The concluding feature of the program will be a motion picture in color, entitled "Living Rock," which was prepared by the University of Georgia and which illustrates soil erosion control practices and possibilities.

Members of the Society residing in Tennessee will be mailed full information regarding the meeting in due course, and members outside the state who desire to attend the meeting will be able to obtain information on request to W. J. R. Browder, section secretary, 1515 W. Cumberland Ave., Knoxville 16, Tenn.

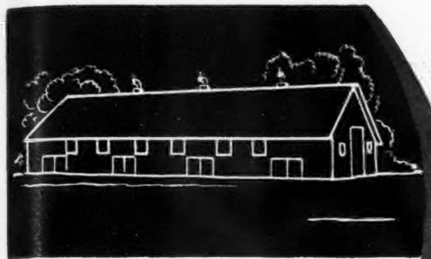
Farm Buildings Institute

OF particular interest to agricultural engineers specializing in farm structures is the Rutgers Farm Buildings Institute recently established at Rutgers University and made possible by the John B. Pierce Foundation. The stated purpose of the Institute is "The advancement of the efficiency and economy of farm operations and the improvement of living standards for farmers and farm workers."

At the special invitation of Dr. William H. Martin, dean and director of the Rutgers University's college of agriculture and experiment station, a group of animal husbandry, dairy and poultry specialists and agricultural engineers from various parts of the country were called to New Brunswick for the five-day period of October 2 to 6 to assist in inaugurating the farm building research studies to be sponsored by the Institute. This group of experts will constitute the national advisory council to the Institute.

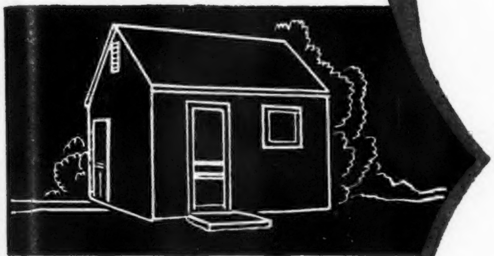
At the opening of the conference Dr. Martin outlined the organization and objectives of the Institute, stressing the generally recognized need for research in the field of farm structures. Deane G. Carter, professor of farm structures, University of Illinois, delivered the keynote address, pointing out the seriousness of the rate of depletion and obsolescence of farm buildings as compared to renewal and replacement and emphasizing *(Continued on page 440)*

The luncheon group at the 1944 meeting of the North Atlantic Section of the American Society of Agricultural Engineers held at the Hotel Commodore, New York, September 26 and 27.

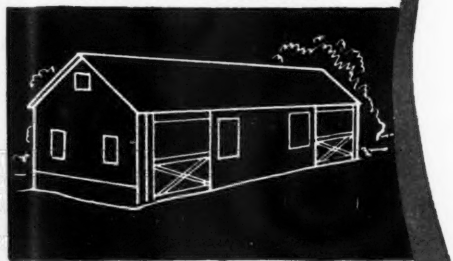


**HOG HOUSE—
walls and ceilings**

**DAIRY BARN—
outside and inside walls**



**MILK HOUSE—
outside and inside walls**



**MACHINE SHED—
outside walls**

**POULTRY HOUSE—
outside and inside walls**

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J-M Asbestos Flexboard— literally a sheet of stone that saws and nails *like wood.*

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Made of asbestos and cement compressed under terrific pressure, Johns-Manville's Flexboard is fireproof, rotproof, moisture-resistant, and can be used indoors or out without affecting its long life. It is extremely strong yet can be curved to a considerable degree. And it has a smooth, dense surface that resists dirt, making it easy to hose, scrub or wash down. It never needs painting or other preservative treatment. And it's surprisingly low in cost, too.

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NEWS SECTION

(Continued from page 438)

the need for buildings that permit more efficient production and handling of livestock and livestock products, Joseph E. O'Brien, general manager of the John B. Pierce Foundation, which is furnishing the technical and financial aid to the Institute, recounted the experiences of that organization in developing research in improved human habitation, speaking in particular of recent developments in structural materials which may greatly influence the type and cost of future farm buildings.

During the period of the conference the group made two visits to poultry and dairy farms in New Jersey in order to study some of the more modern livestock housing projects which have made use of prefabrication and newly developed building material to produce economical and practical livestock housing. In the main, however, the period was devoted to sessions of subcommittees—dairy, poultry, and animal husbandry—each group approaching the problem from the standpoint of the particular livestock in question and the respective need rather than from the standpoint of existing building plans. It is the purpose of the Rutgers studies to establish the fundamental facts relative to livestock habits and environmental factors which may affect their productive capacity. With this approach the subcommittees listed specific items on which additional research is urgently needed, and it is these needs which will occupy the attention of the advisory council in the future. As soon as the individual subcommittee reports have been assembled and edited by the members, ways and means for initiating the various research studies will be developed.

In his opening remarks at the conference, Dr. Martin pointed out how the agricultural engineers fit into the organization of the national advisory council to the Institute. In addition to the dairy, poultry, and animal husbandry experts that will make up the three subcommittees, it was arranged to have two agricultural engineers assigned to each subcommittee, and, as Dr. Martin explained, these agricultural engineers served as the liaison between the subcommittees and the agricultural engineering group which will, in collaboration with architects and engineers of the John B. Pierce Foundation, translate desirable specifications into tangible building plans for the consideration of the livestock experts.

The agricultural engineers who attended the conference and who it is understood are to be the agricultural engineering representatives on the advisory council included, in addition to Mr. Carter, R. H. Driftmier, president of the American Society of Agricultural Engineers, and head of the agricultural engineering department, University of Georgia; A. M. Goodman, extension professor of agricultural engineering, Cornell University; R. W. Trullinger, assistant chief, Office of Experiment Station, USDA; C. E. Seitz, head, agricultural engineering department, Virginia Polytechnic Institute; Wallace Ashby, in charge of farm structures research, Bureau of Plant Industry, Soils, and Agricultural Engineering, USDA, and W. C. Krueger, extension agricultural engineer, Rutgers University. Another A.S.A.E. member, Lindley G. Cook, is secretary of the national advisory council of the Institute.

Personals of A.S.A.E. Members

Hobart Beresford and *K. R. Frost,* respectively, agricultural engineer and assistant agricultural engineer, Idaho Agricultural Experiment Station, are two of the joint authors of two bulletins recently issued by the Idaho Extension Service as follows: Extension Bulletin 118 (revised), entitled "Farm Dairy Structures," and Extension Bulletin No. 147, entitled "Housing Farm Poultry."

James A. Muncey, who more recently has been serving as zone engineer (Region 5) of the U. S. Soil Conservation Service at Lincoln, Nebraska, was recently transferred to the Upper Darby, Pa., office of the SCS, where he now is chief of the water conservation division. His new work involves planning for better utilization of water by agriculture.

John T. Olsen, formerly senior drainage engineer, is now soil conservationist and assistant chief of the water conservation division, Soil Conservation Service, U. S. Department of Agriculture, with headquarters in Washington.

George A. Rietz was recently named manager of the newly created farm industry division (apparatus department) of General Electric Co., which division will be responsible for the development and promotion of farm electrical business outside the farm home. More recently Mr. Rietz has been general manager of the company's customer division. *A. H. Hemker,* rural electrification representative of the company, has also been transferred to the new farm industry division.

J. W. Simons was recently advanced from the position of construction engineer to that of chief, building materials and electrical facilities section, War Food Administration. *(Continued)*

NEWS SECTION

(*Continued from page 440*)

H. P. Smith, chief, division of agricultural engineering, Texas Agricultural Experiment Station, and *M. H. Byrom,* formerly agricultural engineer at the Texas station and now associate agricultural engineer in the U. S. Department of Agriculture, are joint authors of Texas Station Bulletin No. 651, entitled "Harvesting and Curing of Garlic to Prevent Decay," recently issued by that station.

Murrel E. Strickler has resigned his position in the engineering department of the John Deere Harvester Works of Deere and Company and is now employed in the engineering department of Sprague-Sells Division of Food Machinery Corporation at Hoopeston, Ill., where he is engaged in development work on canning machinery.

H. B. Walker, head, agricultural engineering division, University of California, recently accepted an invitation from the Hawaiian Sugar Planters Association to serve as a research consultant on some of their production problems in the Islands. He will be absent from Davis until late in November.

D. E. Washburn has accepted employment in the division of electrical development, power department, Tennessee Valley Authority, and is located at Chattanooga, Tenn. While formerly connected with the agricultural engineering development division of TVA, more recently he has been engaged in engineering work in a wartime industry.

Robert G. White has resigned his position as extension agricultural engineer at Kansas State College, and is now associate agricultural engineer for the U. S. Soil Conservation Service. He is engaged on the SCS hydrologic research project at East Lansing, Mich.

D. E. Wiant and *W. H. Sheldon,* members of the agricultural engineering staff, Michigan Agricultural Experiment Station, are authors of Circular Bulletin 193, entitled "The Michigan Vertical Cup-type Elevator for Small Grain and Shelled Corn" recently issued by that station.

Stanley A. Witzel, professor of agricultural engineering, University of Wisconsin, is one of the collaborators in a symposium, entitled "New Architecture and City Planning," published in book form, and recently issued by the Philosophical Library, New York. Professor Witzel's contribution is entitled "Layout and Organization of Farms, Their Influence on Regional Planning."

Applicants for Membership

The following is a list of recent applicants for membership in the American Society of Agricultural Engineers. Members of the Society are urged to send information relative to applicants for consideration of the Council prior to election.

V. O. Hauswirth, assistant chief engineer, David Bradley Mfg. Works. (Mail) 206 N. Evergreen Ave., Kankakee, Ill.

R. E. Mayo, president, Florence Mayo Nuway Co., Maury, N.C.

J. R. Mohlie, chief engineer, Battle Creek Works, The Oliver Corp. (Mail) 423 E. Michigan Ave., Battle Creek, Mich.

George M. Newlin, manager, Cesor Farms, Farmington, Mich.

H. D. Prichard, sergeant, Williamston Detachment SCU No. 3497, USA. (Mail) Williamston, N. C.

John A. Rohlf, associate editor (farm equipment section), Farm Journal, Washington Square, Philadelphia 5, Pa.

Milton L. Stanius, testing and development engineer of farm equipment, Dept. 817, Sears, Roebuck & Co. (Mail) 457 S. Vine St., Hinsdale, Ill.

B. T. Stephanson, extension agricultural engineer, Department of Agriculture, Edmonton, Alberta, Canada.

John M. Sterley, salesman, B. F. Goodrich Co. (Mail) 333 W. Lake St., Chicago, Ill.

Vernon H. VanDiver, manager advertising division, general publicity department, Union Carbide and Carbon Corp. (Mail) 135-21 Union Turnpike, Flushing, N. Y.

R. E. VanHoosear, manager, Aerovent Fan Co. (Mail) 605 American State Bank Bldg., Lansing 68, Mich.

C. E. Williams, 613 Bryant St., Stroudsburg, Pa.

TRANSFER OF GRADE

Unus F. Earp, engineer (radio), Aircraft Radio Laboratory, U. S. War Department, Wright Field, Dayton, Ohio. (Mail) 650 Kenilworth Ave. (Junior Member to Member)

Allison H. Stephenson, capt., supply officer, 748th AAA Gun Bn., USA. (Mail) 352 Bedford Ave., Bedford, Va. (Junior Member to Member)

Frank J. Zink, consulting agricultural engineer, Board of Trade Bldg., Chicago 4, Ill. (Member to Fellow)

Ag Engineering "Down Under"

To the Editor:

I took a leave of absence from the University of California at Davis last October in order to accept a position as engine-room officer with the Small Ships Branch of the Army Transportation Corps, a service sometimes referred to as the "Army's navy", for which a lifetime hobby of yachting had given me some preparation. I am at present chief engineer of a small Army freighter operating in the New Guinea area.

From rural electrification to marine engineering may seem like a long step but the connections are more numerous than one would think. Even a small ship is rather elaborately electrified these days, largely with equipment with which the older marine engineers are unfamiliar, and the men who have taken hold of the work best are those with an understanding of the physical principles involved rather than those with long experience. The problems of refrigeration on a small ship receiving supplies at infrequent intervals are not so different from those on a farm, and it has been illuminating to me to see what abuse frozen foods can take and still remain very palatable. Quick freezing, uniform low temperature, and prevention of occasional thawing are no doubt desirable but our experience here shows that they are not by any means essential and need not be 100 per cent realized to make frozen storage well worth while. The ability of modern equipment to operate at tropical temperatures — seldom below 85 F and much of the time at 100 F — to refreeze large quantities of meat that have thawed in transit in open trucks or on docks, and to withstand doors left open and interruptions in power supply, all over long periods and with almost no attention, is most impressive.

Diesel engines in sizes suitable for tractors seem to have been intensively developed in connection with amphibious warfare and agricultural engineering will profit eventually. The landing barge maintenance men say the only thing that seriously damages their engines is to go down in salt water while running. It is general practice to let them do that when a barge is hit during a landing, in order to gain every possible yard toward the beach. Easy starting, flexibility, and long runs without attention have been remarkably developed.

The farm structures men would be interested in the good sized native houses built out in the water on stilts, entirely with poles, plant fiber lashings, and coconut fronds. The framing is not so different from that of a farm building in the United States. It doesn't take the natives long to adopt other materials when they can get them, however. They are already using old tarpaulins in place of thatch and airplane belly tanks for canoes in place of dug out logs!

Rene Guillou

Treatment of Electric Shock Victims

To the Editor:

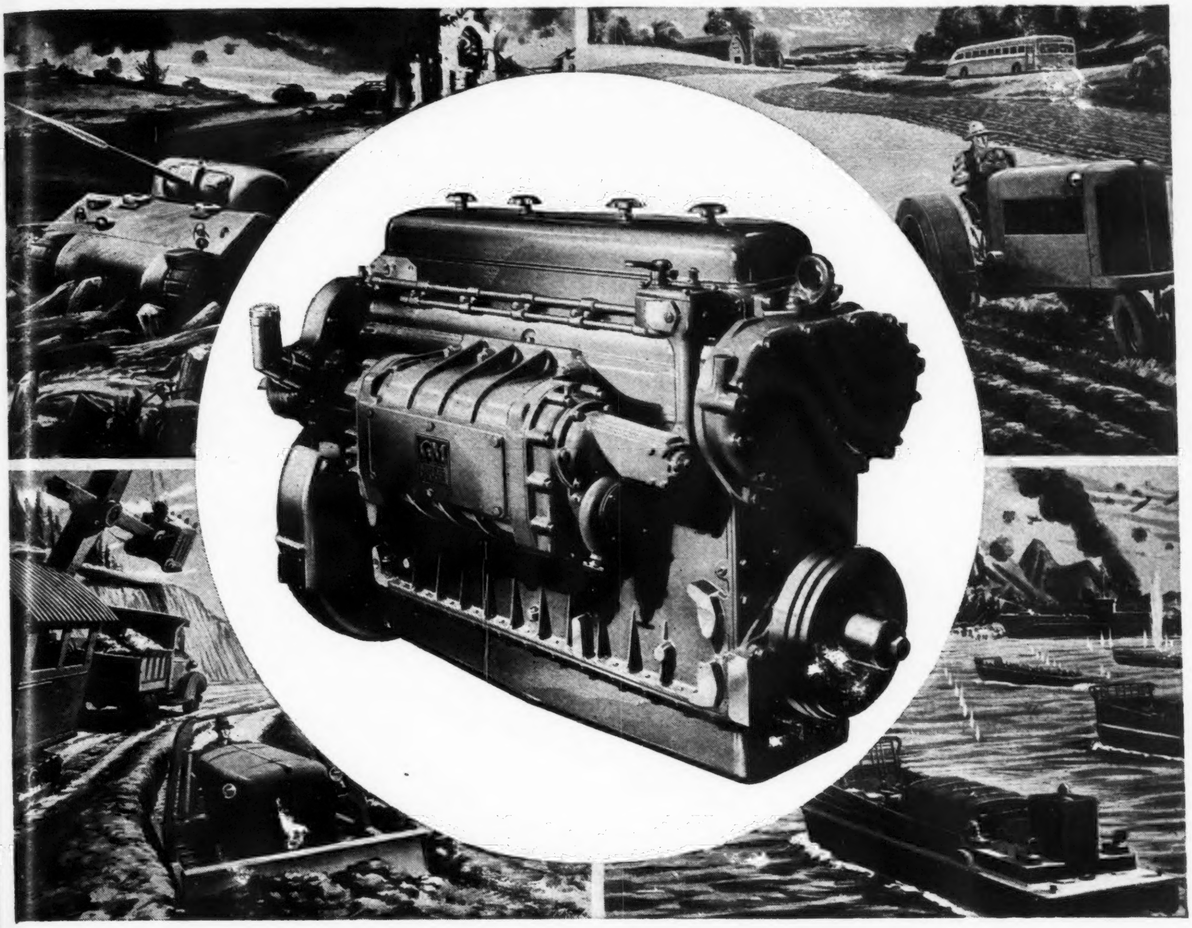
A recent letter from the National Safety Council relative to a death from an electric fence, and the article in Agricultural Engineering for August (1944) by Charles F. Dalziel reporting a death in California on an approved fence — both emphasize the necessity of applying artificial respiration to an electric shock victim *on the spot.* The Duquesne Light Company of Pittsburgh has developed a procedure to work on an unconscious man while he still hangs on the pole. Quick treatment is important and the shock victim should not be taken to a doctor.

The USDA Farmers' Bulletin 1832, "Farm Fences," on page 20, states, "Call a doctor at once," intimating that the patient should not be moved, but the bulletin fails to say so.

There were three men electrocuted this summer in Indiana when they let a pump pipe touch a charged wire. A person trained in first aid might have been able to save them, if he had been available. The greater extension in the use of electricity, which is expected in the near future, will probably bring more cases of such accidents, and it would seem important for agricultural engineers to emphasize the necessity of quick treatment on the spot.

John R. Haswell

Extension agricultural engineer,
Pennsylvania State College



PROFESSIONAL DIRECTORY

Consulting Engineering Work In Farm Structures Field
Also Sales Engineering for Selected Manufacturers

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RATES: Announcements under the heading "Professional Directory" in AGRICULTURAL ENGINEERING will be inserted at the flat rate of $1.00 per line per issue; 50 cents per line to A.S.A.E. members. Minimum charge, four-line basis. Uniform style setup. Copy must be received by first of month of publication.

Procedures For Testing Soils

RECENTLY issued by the American Society for Testing Materials through the intensive work of its Committee D-18 on Soils for Engineering Purposes is a 210-page compilation giving, in addition to all of the A.S.T.M. standard methods, some 38 suggested procedures for investigating soil and soil mixtures. The book is arranged in five sections with standard tests, if any, covered first under each section, then followed by the suggested methods. The five parts are as follows: Part I, Indicator Tests on Soils; Part II, Compaction and Consolidation Tests on Soils; Part III, Strength Tests on Soils; Part IV, Tests for Soil Cement; and Part V, Tests for Soil-Bituminous Mixtures.

Committee D-18 has carried out a great deal of work in this field, has held numerous discussions, and is desirous of eliciting comments particularly on the suggested procedures. Also, the compilation is published preliminary to a discussion or symposium on soil testing to be held at one of the future meetings of the Society.

The publication was developed by a symposium committee headed by F. C. Lang, University of Minnesota, in cooperation with other committee members and the officers. Many authorities in this field have participated in the development of the standard methods and also in the preparation of the suggested procedures.

Copies of the publication in heavy paper binding can be obtained from A.S.T.M. headquarters, 260 S. Broad St., Philadelphia 2, Pa., at $2.25 per copy.

EMPLOYMENT BULLETIN

The American Society of Agricultural Engineers conducts an employment service especially for the benefit of its members. Only Society members in good standing may insert notices under "Positions Wanted," or apply for positions under "Positions Open." Both non-members and members seeking to fill positions, for which ASAE members are qualified, are privileged to insert notices under "Positions Open," and to be referred to members listed under "Positions Wanted." Any Notice in this bulletin will be inserted once and will thereafter be discontinued, unless additional insertions are requested. There is no charge for notices published in this bulletin. Requests for insertions should be addressed to ASAE, St. Joseph, Michigan.

POSITIONS OPEN

FACTORY MANAGER with agricultural engineering background wanted to take charge of a small factory producing barn equipment and hay tools. A permanent position for a man with executive ability and one who is interested in research and development. In first letter give full details as to education, experience, family status, age, etc. PO-173

SALES MANAGER wanted. An old-established, expanding company in western New York employing about 150 persons requires the services of a man experienced in the sale of farm machinery. When applying, give full details as to experience, family, salary, etc. PO-172

MECHANICAL ENGINEER and draftsman required by expanding farm machinery plant with postwar future. Please give full details as to education, experience, qualifications, draft and family status and present salary. Include photograph if possible. PO-171

(Continued on page 448)

EMPLOYMENT BULLETIN

(Continued from page 446)

AGRICULTURAL ENGINEER wanted by January for teaching and research work in agricultural engineering in a western state college. Must be able to handle farm power and machinery and farm repairs for both agricultural students and for training Smith-Hughes teachers. A man with teaching experience preferred, but would consider one with good personality and background who has had extension or practical experience in agricultural engineering. Write giving full details. PO-170

AGRICULTURAL ENGINEER (graduate) specializing in farm structures wanted for resident job in Northwest in plywood research on laboratory and agricultural construction projects. Good personality, initiative, ability to organize and complete projects, and ability to write reports and address technical groups required. Give personnel record, photograph, specimens of draftmanship and technical report writing and salary expected with application. Special consideration given ex-service men. PO-169

ENGINEERS, DRAFTSMEN wanted by a well-known manufacturer of farm and garden implements to develop and design new tools, garden tractors and equipment. Positions permanent. Write giving age, salary expected, and full qualifications. PO-168

FARM STRUCTURES MAN wanted by large company for expanding program in prefabricated farm buildings and components. Excellent opportunity for man qualified in functional phase of design and promotion. Replies should indicate scope of training and experience. Confidential. PO-167

SALES ENGINEER wanted for permanent position with small company producing well-accepted building material products. Substantial base salary, better than average proposition for man with liking for sales work and knowledge of building construction. Give full information on past experience and earnings expected. PO-166

AGRICULTURAL PRODUCT ENGINEER wanted for mechanical designing and development of corn pickers, combines, and other harvesting machines. Permanent position with old well-established midwest manufacturer with national distribution. Located in fine city with adequate housing and educational facilities. Big postwar farm market assures future. Salary open. Good opportunity for advancement. Write experience, qualifications, draft status, and other particulars in your letter. PO-165

ENGINEERING AIDS needed in federal agencies. Persons to perform subprofessional engineering work in civil, topographic, photogrammetric, mechanical, and other branches of engineering are being sought to fill federal jobs in Washington, D.C., and in other parts of the country. The salaries range from $1752 to $3163 a year, including overtime pay. Appointments will be made in the Geological Survey, Department of the Interior, Coast and Geodetic Survey, Department of Commerce, and Department of Agriculture, and application forms may be secured at first and second-class post offices or direct from the U. S. Civil Service Commission, Washington 25, D. C., or from the Commission's regional offices.

AGRICULTURAL ENGINEER wanted by a well-known national organization to engage in sales promotion work on farm buildings, preferably someone in his early thirties with good engineering training and farm background and with plenty of initiative and ingenuity. Special training in farm buildings would be helpful to person selected. Discharged service men will receive special consideration. Write giving full details as to education, experience, etc. PO-164

SALES ENGINEERS, preferably 32 to 38 years of age, with college education in engineering and with sales experience, are wanted by a large national manufacturing organization to engage in the sale of farm buildings through dealers. While a postwar project, qualified applicants will be interviewed now. Special consideration will be given discharged service men who have qualifications sought. Write giving full particulars as to education, experience, etc. PO-163.

POSITIONS WANTED

AGRICULTURAL ENGINEER with a B. S. degree in agricultural engineering from an eastern college is available for employment. Experience in soil conservation, drainage, and use of explosives in land drainage and land clearing; farm reared with experience and knowledge of the operation, care, and adjustment of farm machinery and equipment, also wood-working equipment and farm building construction. Age 38, married, two children. Would like position in teaching, research, or extension work. PW-362